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BANGLADESH AGRICULTURAL RESEARCH PROJECT PHASE-II

R

ANNUAL WORK AND FINANCIAL PLAN
1984-85

BARC-

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BANGLADESH AGRICULTURAL RESEARCH COUNCIL
INTERNATIONAL AGRICULTURAL DEVELOPMENT SERVICE
AIRPORT ROAD, FARMGATE, DHAKA - 15

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ANNUAL WORK AND FINANCIAL PLAN
1984-85

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INTRODUCTION

This report is a requirement of the contract between the Bangladesh Agricultural Research Council (BARC) and the International Agricultural Development Service (IADS). The specific provisions are found in Appendix A, p 14 of the Contract (Reports and Evaluation); as modified by Agreement.

The Specialists of IADS and their counterparts in BARC and the constituent institutes prepared the report. Accordingly, this 1984-85 Work and Financial Plan is approved and authorized by BARC. This document presents activities that are proposed in the nine program areas* during this project year, and support to be provided by project funds estimated to be necessary for their implementation. Additional support items needed are listed (e.g. PhD Training in the US and commodities) but funds are not available in the concerned line items. If reallocation of funds among line items can be arranged, would them be available for those needs.

It is stressed that this document presents the project plans and budget for activities agreed to by BARC (and BARI in specified program areas) and IADS, and found to be acceptable to USAID. It is not a plan of work for IADS Specialists. The role of the Specialists is to assist BARC and its participating institutes to establish a more effective national agricultural research system. The terms of reference for each Specialist were recently revised and compiled in a separate report (August 1984).

The organization of this document is shown by the Table of Contents. The planned activities and project support are presented for each program area. The project support is in the form of IADS Specialists, short-term consultants, local support, overseas training, in-country training, contract research, and commodities (including construction). The project support components are quantified to the extent possible and cost estimates given. Finally, the report contains a summary financial plan.

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- * i) Research System Management, ii) Technical Support (Farm Management, Maintenance, Training and Information), iii) Systems Research, iv) Economic and Social Sciences Research (Agronomy, Crops and Horticulture), v) Livestock, vi) Soil Management, vii) Water Management, and ix) Pest Control.

SUMMARY

This 1984-1985 Work and Financial Plan is for the fourth year of Phase II of the Bangladesh Agricultural Research Project. It was prepared by IADS Specialists and their Counterparts, approved and authorized by BARC, and found to be acceptable by USAID. The plan presents activities proposed in each of the program areas specified in the contract, and support for them to be provided by project funds.

Particular attention has been given to specification of program area objectives, and activities needed to achieve them. This should facilitate implementation, monitoring, reporting and evaluation. Specialists and Counterparts will review and report quarterly on progress in the program areas. Their reviews will be analyzed, in turn on a quarterly basis, at the BARC/IADS/USAID meetings. An external evaluation is planned for the third quarter of the year.

The objectives and activities, described in each of the nine program area presentations, are to receive project support in the form of IADS specialists and consultants, overseas and in-country training opportunities for Bangladeshi scientists, contract research, and commodities and construction.

The estimated budget from project funds is \$ 6020,100 (see table-1). A breakdown by line items and program areas is shown in Table 4. An estimated, additional \$1,134,800 is budgeted for IADS headquarter staff expense, management fee and procurement fee for the fiscal year. Expenditures through 1983-1984 plus funds estimated for 1984-1985 total \$14,232,400 or 65.3% of total project funding (see table 2). Furthermore, financial obligation beyond 1984-1985 resulting from approval of this work plan are estimated to be \$2,532,550, leaving about \$5,035,050. Please note: the "beyond 1984-1985" estimate does not include costs associated with technical assistance (Specialists), local support and IADS headquarters expenses. The level, of which will need to be determined in future budgets.

1984-85 requests for commodities and construction were \$503,390 and \$76,500 respectively. Since these line items are exhausted, these requests were denied and a zero budget included in 1984/85. However the requests denoting expected costs are included in the work plan itself in the event that a transfer of funds from other line items becomes probable.

Acceptance of this work and financial plan has two other important implications. Firstly, there is a need for reallocation of funds among line items. And secondly project funds will be committed into fiscal year ending 30 June 1990. As recommended in the 1983-1984 internal evaluation report, BARD, in consultation with USAID, will propose an extension of the project within the approved level of funding.

Most importantly, it should be noted that the present contract funding agreement expires on 30 June 1986. A specific activity of this work plan which will commit funds beyond June 1986 must not be implemented unless:

- A) an alternative source of funds for the activity are appropriated for the period extending beyond this contract's expiration date; or
- B) an extension of the contract providing adequate coverage is obtained.

RESEARCH SYSTEM MANAGEMENT

INTRODUCTION

This program area is to assist the Chairman and Member-Directors of BARC, and the directors of constituent institutes, in the effective use of physical and human resources for agricultural research, through better program planning, implementation and evaluation. Support is also intended to strengthen the management of the national agricultural research system through BARC'S coordinated administrative support services, including budgeting, financial control, procurement and personnel services.

PLANNED ACTIVITIES

During 1984-85 project support is expected to be used to realize the following activities:

1. Increase competence of staff in research system management.

This activity will be addressed through training. Academic training will be provided through one PhD and one MS scholarships. Three persons will be sent to the USA for non-academic training in research management, two of these in human resources management. The second in a 12-months USDA program in Washington.

In-country training will be provided in use of microcomputers, research program evaluation, management, planning, technology diffusion, dynamics of mangement, financial management, and evaluation (See "Short-Term Training").

The research management capability of BAU will be strengthened by a sabbatical study for a member of the BAU management development center.

2. Strengthen administration of the project.

More effective use will be made of the Specialists by strengthening their terms of reference, and clarifying their counterpart relationships. A consultant will be used to assist in this task (July-August).

Project review and planning will be strengthened by having scheduled quarterly meetings of specialists and counterparts when they will review progress in the past quarter and plans for the current quarter. Notes on these meetings will be provided to the Chairman of BARC and to the IADS Project Supervisor as inputs to the quarterly BARC/IADS/USAID meetings.

Project administration procedures (e.g., scheduling of activities) will be sharpened through the assistance of a consultant, scheduled for the first quarter.

A computerized accounting system for project financial management will be implemented. A consultant will be needed to assist in the computerization for a period of three months. Also, a complete system for procurement, inventory maintenance and control of commodities purchased under the project will be in place.

3. Provide financial support for research.

Contract research will be used to strengthen critical areas of the national research program. A manual on contract research will be released and distributed during the first quarter. An Administrative Order will be issued by BARC to inform principal investigators and institutions about financial accounting requirements under contract research. A workshop will be held in the second quarter during which principal investigators will present their findings. Participants will be reminded about reporting procedures - technical and financial. Donors will be encouraged to participate in these meetings.

4. Evaluate project activities.

BARC will use evaluation as a management tool for activities carried out under the project. The report of the Internal Evaluation (May 1984) will be distributed in the first quarter, and will be used to make appropriate adjustments in the 1984-85 work and financial plan.

The second External Evaluation will be held in May 1985. Arrangements for this review will start early in 1985 and be reviewed at the third quarterly BARC/IADS/USAID meeting in January 1985.

5. Publicize BARC services.

A brochure will be published (tentatively in the second quarter) to describe the major services of BARC to scientists in the national agricultural research system (primarily contract research and training).

PR SUPPORT

1. Specialists and Consultants

\$242,450

** Specialists

- * Research Management Advisor and Project Supervisor (12 person-months).
- * Administration Specialist (12 person-months).
- * Deputy Project Supervisor. This responsibility will be handled as an additional activity by the Farming Systems Specialist. He serves as Acting Project Supervisor when the Supervisor is absent, and also will have specific responsibility for the coordination of contract research, and the quarterly BARC/IADS/USAID meetings.

** Consultants

- * A consultant will be employed for 3 weeks in the first quarter to review and revise where necessary the functional terms of reference of each of the IADS Specialists.
- * A consultant will assist for about one month in the first quarter to improve procedures for project administration.
- * A consultant will assist for about three months (November-January) to format and input the accounting records, financial statements and budget on computer software compatible with Apple Personal Computer hardware. Selection of appropriate software and format design will be determined by the Administration Specialist.

- * Additional consultancy services are anticipated which cannot be specified at this time.

2 Local Support

\$357,500

The component includes costs of operations of the IADS Local Support Unit, office operations, research supplies and equipment, household furniture, vehicle operations, in-country travel, evaluation, and rents and utilities. Details are shown in the budget summary of this report. Limited support is also provided to the IPSU of BARC, largely in the form of office supplies.

3. Overseas Training

\$ 72,250

** PhD in USA \$ -0-

** MS in USA \$ 11,600

* Candidate from Ministry of Agriculture in Research Systems Management, (September 1985- September 1989). NONE \$ -0-

* One in farm operations. Planned September 1985-March 1988. Person-months 1984-85 NONE \$ -0-

* One in Agricultural Information/Communication Planned September 1985-March 1988 Person Months 1984-85 0.0 NONE

* One in Human Resource Development Training Planned September 1985-March 1988. Person Months 1984-85 0.0 NONE

* One in Research Systems Management (August 1983- February 1986). Person 1984-1985 12.0. \$11,600

** Up to 6 months in USA \$ 27,200

* Two persons will attend the Arthur D. Little Course in Human Resources Management at Cambridge, Massachusetts, in April. If possible, they will also attend a management communication course at Lansing, Michigan. Person-months 1984-1985 4.0. \$ 6,800

* One person will be sent for a 12-months training program in management in the USDA program in Washington, D.C. Date of initiation August; Person-months in 1984-85 10.0. \$20,400

** Up to 6 months in TWC.
Committed Costs of 1983-1984 yet to be recorded. \$ 1,300

** International Conferences \$ 12,150

Additional needs are anticipated for Bangladeshi participation in international conferences, such as at the international agricultural research centers. Resources are needed to meet priority cases.

** Staff Travel \$ 20,000

Funds will be needed to support international staff travel that is consistent with project objectives, but which cannot be specified at this time.

4. In-Country Training

\$173,175

** Short-Term Courses

\$172,600

- * A 3-month training course will be held, with assistance from Michigan State University, on use and maintenance of microcomputers. About forty participants are anticipated. \$25,000
- * The International Service for International Agricultural Research (ISNAR), in cooperation with BARC and IADS, will conduct two training workshops in research management. The first, scheduled for October 1-3, is Regional Workshop on Research Program Evaluation. About 50 participants are expected. \$25,000
- * An OICD/USDA course on Management Planning and Evaluating Research Organizations will be held for 25 persons in December 1984. \$44,000
- * An OICD/USDA course on Technology Diffusion will be held for 25 persons in January 1985. \$44,000
- * A 3-days course on financial management of development projects will be conducted by ISNAR for 40 persons in the fourth quarter. \$20,000
- * A course on dynamics of management will be conducted for 4 weeks for 10 people by AIM in the fourth quarter. \$14,600

** Sabbatical Studies

\$ 575

A sabbatic study in research management will be provided for one staff member of BAU management development center to study research project administration. Duration twelve months. Person-months 1984-1985 6.0.

\$ -0-

5. Contract Research

\$ -0-

6. External Evaluation

\$ 15,000

* May 1985 Estimated cost \$ 30,000 Budget 84-85 \$15000

7. Commodities

\$195,000

** For Specialists

These consist largely of vehicles, computers and office equipment approved for procurement during 1983-1984.

8. Contingency

\$250,000

This amount is included to meet unplanned, unanticipated priority needs, particularly in training (e.g. in extension methodology, experiment station Farm development and management planning and evaluation methodology agricultural information, and dry land farming).

TOTAL

\$1,309,375
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TECHNICAL SUPPORT SERVICES

This program area consists of four components: Farm Development, Maintenance, Training and Information. The planned activities and project support for each will be dealt with in turn.

A. FARM DEVELOPMENT

INTRODUCTION

The purpose of this program component is to improve the research station farms of institutes under the aegis of BARC, with particular attention, at least initially, to those of the BARI central and regional stations. The improvements include land levelling, field layout, irrigation and drainage. This program component is coordinated by the Member-Director (Agricultural Engineering) at BARC.

PLANNED ACTIVITIES

Project support for farm development will be limited in 1984-85, as anticipated in the Contract between BARC and IADS (The IADS Farm Development Specialist was scheduled for three years, and completed his assignment at the end of project year 1983-84).

1. Plan for improvement of BARI experimental farms.

A plan will be developed in the first quarter of 1984-85 to improve the farms and farm management (shaping, land preparation and water management) of BARI-Joydebpur and the regional stations. A consultant in experiment station development and operations will assist, and present a report of the end of the assignment.

2. Improved farm management support for the scientists.

Through earlier Project-supported training - primarily in-country and provision of equipment and construction in 1984-85 - farm management support for field research will be strengthened at BARI-Joydebpur and the regional stations.

PROJECT SUPPORT

1. Specialists and Consultants

\$ 10,825

** Specialists

- * The IADS Farm Development Specialist completed his assignment at the end of 1983-1984. There are no plans for a replacement. Person-months Project support will be used to assist in the repatriation of personal and household effects of this Specialist.

** Consultants

- * A experiment station farm development and operations consultant will be used in the first quarter to assist in the development of a plan to improve the farms and management of them, at BARI-Joydebpur and its regional stations. Person-months 1.0.

2. Local Support

\$ -0-

3. Overseas Training

\$ -0-

4. In-Country Training

\$ -0-

5. Contract Research

\$ -0-

6. Commodities

\$ 64,760

- * Consists of Agricultural Equipment ordered during 1983-1984.

** Construction.

\$ 69,000

Construction at BARI in
progress expected to be
completed during 1984-1985.

TOTAL

\$144,585

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B. EQUIPMENT MAINTENANCE

INTRODUCTION

Maintenance is concerned with the establishment and strengthening of facilities at the research stations for the efficient repair and maintenance of farm and laboratory equipment. It includes organization of efficient and rapid procurement and supply procedures, inventorying, and training of personnel.

PLANNED ACTIVITIES

1. Development of a basic maintenance plan.

A basic maintenance plan for the field and laboratory equipment at the BARI central and regional stations was completed in the last quarter of 1983-84 by the Maintenance Specialist and is under consideration by the Director of BARI. This plan is adaptable; it can be used to deal with field and laboratory equipment inventorying, repair spares, tools, fertilizers, seed stocks, etc. Likewise, it is adaptable to other participating institutes of BARC. It is assumed that a decision will be made by BARI by the middle of the second quarter of this project year to accept the basic maintenance plan, as suitably modified. Due attention will need to be given to the value of the BMDC report in finalizing the basic maintenance plan.

2. An inventory (density list) of field and laboratory equipment at BARI.

A computerized inventory will be completed by the middle of the third quarter of field and laboratory equipment at the BARI central and regional stations (numbers, make, model and serial number). Two local consultants will assist in this task.

3. An inventory of repair spares.

An inventory of repair spares at the BARI central station was completed during the last quarter of 1983-84. Corresponding inventories will be completed for all of the regional stations by the middle of the third quarter, assuming BARI acceptance of the basic maintenance plan. A substantial order for repair spares is expected to arrive during the second quarter. This order contains storage bins and work tables for these parts.

4. A repair spares manual library.

This library will be located and maintained at the central station of BARI. It will be basically completed by the end of the second quarter (70% complete by the end of the first quarter).

5. An inventory of tools.

This computerized inventory will be centered at BARI, Joydebpur. It will be complete by the middle of the third quarter. New tools on requisition, which will be added to the inventory, are expected to arrive by the middle of the second quarter.

6. Increase competence of maintenance personnel.

Staff competence will be strengthened through TWC and in-country training. One person from BARI will be sent to a TWC (possibly AIT in Thailand) for training in maintenance of laboratory equipment. This is planned to start at the beginning of the third quarter. Three short term training courses will be held in the third and fourth quarter, primarily for maintenance personnel at the BARI central and regional stations. However, trainees from other participating institutes will be encouraged. A total of about 54 trainees is planned.

7. Support to the IADS Service Unit.

The maintenance component of the Project will provide some support to the IADS Service Unit, particularly in the improvement in operation and maintenance of the transport section.

PROJECT SUPPORT

1. Specialists and Consultants

\$ 76,500

** Specialists

- * An IADS Maintenance Specialist will be based at BARI Joydebpur to assist in the planned activities. He will be responsible to the Director and work with the Farm Superintendent, BARI. person-months 12.0.

**** Consultants**

Two local consultants will be used (one for 3 months-2nd quarter, and one for 3 months-3rd quarter) to develop the inventory of equipment of the BARI central and regional stations. Person-months 6.0.

2. Local Support

\$ NONE

3. Overseas Training

\$ 3,000

**** Up to 6 months in TWC**

- * One person from BARI for training in laboratory equipment operation, maintenance and repair-possibly at AIT-starting at beginning of the 3rd quarter. Person-months 6.0.

4. In-Country Training

\$ 3,400

**** Short-Term Courses**

\$ 3,400

- * A 10-days course on shop stores and maintenance, records and spare parts will be held at BARI in the 3rd quarter, with 14 participants. Maintenance Specialist will be the lecturer/demonstrator. \$ 1,000
- * Two 14-day courses on maintenance of motorized equipment will be held at BARI on in the third quarter, and the second in the fourth quarter. Twenty participants for each course. Maintenance Specialist will be the lecturer/ demonstrator. \$ 2,400

5. Contract Research

\$ -0-

6. Commodities

\$ 21,690

** Commodities

- * 1983/84 committed costs for tools and spare parts \$ 21,690

* In the 3rd quarter a requisition will be placed for a comprehensive list of key spare parts for equipment currently on hand at BARI central and regional station. The list will be ready by the middle of the 3rd quarter. Estimated cost 40,000 subject to transfer of funds from another budget line item.

7. Construction

NONE

- @* Plans will be initiated in the 2nd quarter for construction of six tool rooms at the BARI central and regional stations. These rooms are in existing buildings. Construction will start and be completed in the second quarter. The estimated cost is \$2,000 per tool room. Estimated Cost \$12,000 subject to transfer of funds from another budget line item.

TOTAL \$101,590
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C. TRAINING (HUMAN RESOURCE DEVELOPMENT)

INTRODUCTION

The purpose of the human resource development section of this project is to upgrade the research and management skills of the professional and technical level persons employed by the BARC and its constituent institutions.

BARC has created a Training Cell as the organizational body which is given responsibility for the development of human resources. This cell is staffed by a Director of Training, one SSO, two SO's on temporary deputation, one Typist and one peon. It handles training estimated to cost \$9.5 million of donor funds, of which the USAID-supported BARC/IADS Project is one part, consisting of \$3.39 million.

The Training Specialist, attached to the Training Unit assists the program in all of the activities described below.

PLANNED ACTIVITIES

The objectives of the Training Program for 1984-85 are to 1) handle the various training activities planned and budgeted under the other program areas other than training; 2) handle training activities at BARC not included in the nine program areas; 3) improve the capabilities of the personnel of the Training Cell; 4) complete a research manpower survey; 5) update the Manpower Development Handbook, and 6) publish an international brochure on the services and activities of the Training Cell.

1. Handle/manage/provide support for the training component of programs areas other than training.

The training program through the Training Unit will be responsible for the following components of support for this training: monitor ongoing degree programs to insure academic success and fiscal responsibility of participants; select and gain admission for new scholarship awardees; provide financial support and assist with logistical support for short term training courses; provide financial and organization support for scientific conferences and workshops; assist in planning and providing financial support for travel and observation tours; and review and select sabbatic leave applications and to monitor their proposed research expenditures.

One or more components of support will be provided as follows:

(a) Degree Programs:

- * Ongoing in USA & TWC - 31 scholars;
- * Ongoing Incountry - 21 scholars;
- * Requested new USA & TWC - 24 scholarships;
- * Admissions Pending for 19 incountry scholarship awardees

(b) Short Term Trainings:

- * Incountry - 76 short term incountry courses having durations ranging from one week to three months are proposed. Class sizes range from 10 to 50.
- * Out of Country - The technical specialists have proposed to send 89 persons abroad for short term trainings ranging in length from two weeks to nine months.

(c) Conferences and Workshops:

- * The technical specialists have proposed that approximately 382 people attend conferences and workshops.

(d) Staff Travel

- * The technical specialists have proposed that approximately 37 persons travel outside the country.

(e) Sabbatic Leave

- * The technical specialists have proposed that nine persons be granted sabbatic leave awards.

2. Training support activities not included in the other program areas.

The training program has responsibility for handling support activities for trainees that do not properly fall within a single program area. This year there will be four scholarships in Agricultural Extension Education: PhD two, and MS two.

3. Improvement in the qualification of personnel of the Training Cell.

Plans are to send two persons for an eight-week training course at Arthur D. Little, at Cambridge, Massachusetts, in April funded under Research Systems Management.

4. Complete a research manpower survey

This important management tool for long term planning in trained manpower will be completed by the end of the second quarter. The Training Specialist will devote a substantial amount of his time on this activity. The survey will be computerized and kept current.

5. Up date the Manpower Development Handbook

This important document, having already proved its value, will be revised and updated by the end of the second quarter. The Training Specialist will play an important role in this work.

6. Publish an international brochure on the services and activities of the Training Cell

This brochure will be published by the end of the second quarter.

PROJECT SUPPORT

1. Specialist and Consultants \$49,000

** Specialist

- * One Training Specialist will continue in the program area until January 11, 1985. No Replacement is planned.
Person-months (1984-85) 6.5

2. Local Support NONE

3. Overseas Training NONE

** Up to six months training in USA

- * Eight weeks training for two people from the Training Unit at Arthur D. Little Course at Cambridge Mass in April, 1985. Funded under Research Systems Management.

4. Incountry Training

\$ 1490

** Scholarships:

\$1490

* One on-going PhD at BAU
(Feb/84-Feb/88). Person
Months in 1984-85 6.0 \$ 610

* One intended PhD at BAU
expected period of study
in Feb/85-Feb/89. Person
Months in 1984-85 6.0 \$ 400

* Two intended MS at BAU
expected period of study
in MAY/85-Oct/86. Person
Months for 1984-85 12.0 \$ 480

Note: Six months scholar-
ship fund is paid at
the commencement of
a Bangladesh degree
and following every
six months afterwards.

5. Commodities

\$ 13,300

** One IBM PCI Microcomputer, to
be used for the purpose of
developing and maintaining
training data for reports,
and for compilation of a
human resources inventory of
the BARC professional and
technical personnel which
will provide 25 data items
on each person; and \$700 of
1983/84 committed costs of
audio visual equipment.

Total

\$ 63,790

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D. AGRICULTURAL INFORMATION

INTRODUCTION

This program area is to assist the Chairman of BARC with the development of a program of agricultural research information and library services for the national agricultural research system. Support is intended to include planning for the development, design and distribution of printed information and audio-visual materials, the orderly expansion of scientific libraries and documentation services, and the design and implementation of staff development programs for the improvement of information systems and of library services.

PLANNED ACTIVITIES

During 1984-85, project support is expected to be used to realize the following activities:

1. Improve the understanding and increase the support for agricultural research in Bangladesh by decision-makers.

This activity will include the production and distribution of printed and audio-visual materials to describe BARC and the constituent institutions to national and international, public and private audiences. The activity will include materials for selected audiences, including the revision of This is BARC, the second edition of Agricultural Research in Bangladesh and the translation and production of a Bengali edition, and the English and Bengali versions of slidefilm programs on BARC and the agricultural research system.

2. Improve the interchange of research and other relevant information among agricultural scientists and related personnel of Bangladesh.

This activity will include assisting the Chairman with the development of a policy statement on the role and functions of agricultural information and other communication activities in the national agricultural research system.

It will include the production and distribution of a regular newsletter to researchers in the national agricultural research system, and the compiling, production and distribution of the proceedings of the first National Symposium on Agricultural Research.

This activity also will include training for editors and managers of agricultural science journals to provide more timely flow and better quality research knowledge to scientists and other users; and training to improve the communications skills of researchers so they can better disseminate the results of their research.

3. Assist in providing effective library and documentation services to support the research of agricultural scientists of Bangladesh.

This activity will focus on training opportunities for personnel responsible for libraries of the national agricultural research system, and increasing the availability and distribution of scientific literature among the research community.

PROJECT SUPPORT

1. Specialists and Consultants \$103,050

** Specialist -- Agricultural
Communication Specialist
(12 person-months)

** Consultants

* A consultant will be employed for 1 person-month in the third quarter to evaluate the communication needs of the national agricultural research system, with emphasis on publication programs, availability and use of scientific literature, and development of communication media to improve the flow of research knowledge.

* A consultant will be employed for 1 person-month in the third and/or fourth quarters to design and implement a system for computerization of the libraries of the national agricultural research system.

2.1	Local Support	NONE
3.0	US Training	\$23,600
	** Up to six months - USA	\$13,700
	* Training in the USA in communication skills and management for two persons designated for library posts in the national agricultural research system; training programs to be developed by Cornell University. Person Months 1984-85 6.0	\$10,200
	* Training in the USA in a USDA course on "Communication Skills for Professionals" on December 26, 1984-January 6, 1985 for an official designated by the Secretary, Agriculture and Forests.	\$ 3500
	** International Conferences	\$7400
	* Additional needs are anticipated for Bangladesh participation in international conferences on agricultural information and on library sciences, but for which descriptions, dates and sites are not yet available in the country.	
	** Staff Travel	\$ 2500
	* Funds will be needed to support international staff travel requested by the Chairman for senior research managers to improve their understanding and use of communication in the research process, but which are not specified at this time.	
4.0	In-Country Training	\$4200
	** Short-Term Courses	\$4200

* A series of 15 one-day workshops will be held at agricultural research facilities to improve the communication skills of researchers in the presentation of scientific information. A communication training expert will be employed to organize and conduct these workshops in the third and/or fourth quarter.

\$1800

* A one-week workshop will be held in January to improve the skills of about 40 personnel concerned with libraries of the agricultural research system; training to be organized and conducted by NALDOC.

\$1200

* A one-week workshop will be held in the fourth quarter to improve the quality of Bangladesh agricultural science journals by improving the editorial and management skills of those responsible for the publications.

An editor manager of an agricultural journal from another country will be employed to organize and conduct this workshop.

\$1200

5. Contract Research

NONE

6. Commodities

\$ 55,010

* 1983/84 committed cost for journals and equipment

\$45,010

* Audio System for Conference Room at BARC

\$10,000

* Production and distribution of six issues of AGRESEARCH NEWS newsletter, 2000 copies each.

FARMING SYSTEMS

INTRODUCTION

The Farming Systems Program area will focus its activities to strengthen the agricultural research to be carried out directly in farmers' fields with farmers' participation. The National Coordinated Cropping Systems Research Program organized in 1980 has generated valuable information in the last four years. The technologies found to be suitable in the cropping systems research sites which have been operated by BARI, BJRI, BRRI, SRI, BWDB, BAU will be transferred to a large number of farmers and extension officers by means of multilocation testing programs and by establishing pilot production programs. These activities will demand tight linkages between farmers, extensionists and research.

The project area will continue its technical support to the National Cropping Systems program which is coordinated by the Member-Director, Crops Division of BARC.

The activities of the Farming Systems Project area in different region of Bangladesh will be back-stopped by the local staff and IADS production agronomist located at the BARI's regional stations of Ishurdi, Jessore and Jamalpur. Funds for the projects will be provided in part from USAID but most of the budget will be from the World Bank loan managed by BARC.

The thrust of the Agricultural Research project is a Farming Systems approach. This approach has been followed in the past years, with emphasis in cropping systems. In the present year, livestock, fisheries and social forestry will be incorporated in the research plans. Other program areas of the Project will support the activities in Farming Systems.

PLANNED ACTIVITIES

1. Continue Farming Systems Research (cropping pattern testing, component technology studies, researcher-managed trials) in 20 selected cropping systems sites of the Agricultural Institutes participating in the National Coordinated Cropping Systems Research Program, including the following:

Hathazari	(BARI)
Jamalpur	(BARI)
Jessore	(BARI)
Ishurdi	(Palikapur) BARI
Rangpur	(BARI)
Ishurdi	(SRI)

Trishal	(BAU)
Kishoregonj	(BJRI)
Thakurgaon	(BWDB)
Noakhali	(MCC)

2. start multilocation testing (MT) Projects in the locations selected by the On-Farm Trial Division of BARI, and in all the cropping systems project areas listed above.
3. Select 3 villages in each of the MT locations to test the two or three important cropping patterns. Each cropping pattern will be tested in at least ten farmers' plots. This way the technology will be tested in 90 different plots (parcels) in each of the selected sites.
4. All the Institutes involved in cropping systems research in the sites will participate in the "Multilocation testing Program". The MT plans will be developed in a workshop with the principal investigators and site coordinators of cropping systems research sites in the month of September. The program will start in the winter season 1984-85.
5. Start Farming Systems Research (FSR) in three selected areas of Bangladesh. A thrust will be chosen for each area, according to the importance of a given component. Livestock, Crops, Forestry, Fisheries are the thrusts.
6. Develop detailed FSR program plans to be implemented in each of the areas mentioned in 5 above. These research program plans will include technical programs, infrastructure and budget.
7. The principal investigators and site coordinators will prepare a progress report at the end of each season and a yearly report consolidating the results of the three cropping seasons. The seasonal reports will be brief and will follow a format to be elaborated by the National Cropping Systems Program (NCSP) coordinator or co-coordinator. The annual report will be submitted to the NCSP not later than September 30. The coordinator will prepare a consolidated report to be ready in November.
8. Field days (20) will be organized in the Regional Research Stations Cropping Systems sites, and multilocation testing sites. The Principal Investigators and site coordinators will be responsible for the organization of the field days.

PROJECT SUPPORT

1. Specialists and Consultants

\$311,525

** Specialists 4 (48 person-months)

One senior Farming Systems Specialist posted at BARC; three production agronomists, one each located at Ishurdi, Jessore and Jamalpur, will support the activities of this program.

** Consultants (25 person-months)

* Three specialists experienced in planning and implementing FSR projects. Each consultant will spend 4 weeks developing specific research plans for three areas selected for FSR. The consultants will have experience in crops-water management interactions, livestock, fisheries, and agro-forestry and social forestry. They will collaborate with the local staff in designing research projects to test specific hypotheses (3.0 person-months November).

* One consultant as interim Production Agronomist posted in Jamalpur. He will also work with the principal investigators of the National Coordinated Cropping Systems Program with the head at the "On Farm Trial Division" of BARI, in reviewing the organizations and progress of ongoing multilocation testing programs and in designing pilot production Projects. He will elaborate together with the Farming System Specialists and the Training Cell Staff a plan for the training program for the course "Farming Systems Research Methodology". (3.0 person-months August-October).

* As agricultural economist with experience in socio-economic studies, to organize and assist in the implementation of surveys for pre-production verification trials and pilot production programs. The consultant will train a group of scientific officers working in the cropping systems and multilocation testing sites, in methodologies for short-term surveys, and preparation of the reports. (1.0 person-months October).

* Three local consultants with experience in socio-economic surveys, to organize and implement surveys at the farming systems or cropping systems sites. Each consultant will serve for 6 months. The objective of the surveys will be: (a) to assess the farmers' awareness of the technologies tested in the cropping sites (including the multilocation testing sites), and (b) to carry out baseline surveys of the present status of livestock, fisheries and poultry, its production and management practices in the project area. (18.0 person-months October-March).

2. Local Support

\$ -0-

3. Overseas Training

\$ 49,150

** PhD in USA

\$ -0-

** PhD in TWC

\$ 5,000

* One at UPLB. Agronomy (Utilization of residual moisture after rice) May 1983-1987 - will work in BARC in coordination with the National Farming Systems Research Project. Person-months in 1984-1985 12.0.

** MS in TWC

\$ 4,700

- * One at UPLB - Agronomy. May 1983 to December 1985. Person-months in 1984-1985 12.0.

This scientist is to be assigned as coordinator of Cropping Systems sites.

** 6 months training in TWC

\$ 6,750

- * Three participants. "Farming Systems Training Course" IRRI. March-June (4.5 months) will return to work in the Cropping Systems sites.

** International Conferences

\$ 26,100

- * Asian Farming Systems workshops will be held in December 1984 at IRRI and January 1985, at ICTA. Two participants from Bangladesh, the National Coordinated Cropping Systems Program Coordinated Cropping Systems Program coordinator (or his representative), and one principal investigator from a participating institute.

\$ 3,200

- * Farming Systems Symposium, Kansas, USA. Two participants from Bangladesh: Member-Director (Crops) and Head, On Farm Trial Division, BARI
Date: October 1984.

\$ 3,700

- * International Conference in Farming Systems Research in Bangladesh is planned for the third quarter of this year. Fifty Bangladeshi Scientist and five expatriates are expected to participate for a period of one week.

\$19,200

** Staff Travel

\$6,600

- * Two monitoring tours, one to the Philippines and another to Thailand, to visit the Farming Systems Research sites for two weeks. Three cropping systems site coordinators will participate in each tour. Person-months in 1984-1985 1.0.

4. In-country Training

\$ 8,150

** Short-Term Courses

\$ 4,000

- * Cropping Systems Research Methodology.

This training course will be organized with the collaboration of BRRI, BARI and BARC with Bangladeshi trainees. The participants will be scientists to be appointed as site coordinators. Twenty to twenty-five participants are expected. Two courses will be offered, one during the summer season and another in the winter. Person-months in 1984-1985 1.0.

\$ 4,000

** Discussions/Seminars

\$ 3,000

- * At least one field day each crop season will be organized in the cropping systems/farming systems sites of the institute participating in the cropping systems program and multilocation testing sites. These field days will be organized by the principal investigators and site coordinators during the month of August (for early kharif season), November (for late kharif season), and February (for rabi season). These field days will be for the extension personnel and the farmers of the project area (twenty to thirty participants).

The objectives of the field days are (1) to inform the extensionist about the suitable technology to be transferred to other farmers and (2) to acquaint farmers in the project area with technology under evaluation.

- * One workshop will be organized in each participating institute. The participants in these workshops will be the research and extension personnel of the different institutions. The objectives are (1) to discuss the results of the last year's activities with emphasis in the identification of suitable technology to be transferred, and (2) to discuss and get feed-back information for future research activities. The principal investigators and coordinator of the NCSP will be responsible for the planning and organization of the workshop the institutes will determine the appropriate dates.
- * Training sessions for farmers will be organized at the experimental stations and institutional headquarters at least a year. The objectives are (1) to familiarize the farmers with the proven technology at the cropping systems sites, and (2) to show to the farmers the field experiments and discuss about the performance of improved practices and benefits of agronomic practices like fertilizer application, planting dates, land preparation, and pest control. The training of farmers will be organized by the site coordinator and his associated staff. Planned months for holding the training are February and June.

- * Training courses (2-3 days) for extensionists will be organized by the principal investigators and site coordinators this year. The objectives are (1) to inform the extension personnel about the technology under evaluation in the cropping systems and multilocation testing sites; (2) to identify the technology suitable to be transferred to other rural areas; (3) to show to the participants the crops and production technology at the experimental stations; and (4) to get feed back from the extensionists about research needs for the rural areas.
- * Each site coordinator will organize a seminar at the regional station or institute headquarters to present the results of last year's research at the respective sites. The principal investigators and coordinators of the program will attend these seminars whenever possible. The site coordinators will inform BARC and the principal investigators about the dates of the seminars are scheduled. Planned dates February/March.
- * NCS program coordinator will organize monitoring tours for the principal investigators to visit the cropping systems, farming systems and multilocation testing sites. The principal investigators will elaborate schedules for the site coordinators, agronomists and economists to visit some of the other sites in the country. These tours must be organized in early February for the winter season and November for the late kharif season.

- * Farmers participating in the cropping systems and farming systems problems will be familiarized with the technology under testing or evaluation in each site. The site coordinators will organize discussion sessions with small groups of farmers of the project area, to review the performance of the crops and crop technology. Each field assistant in the sites will be responsible to organize small groups will be organized at least twice in each season.

** Sabbatical Studies

\$ 1,150

- * One irrigation agronomist will participate in collaborative research with the water management program to study the crop productivity and/or overall farm productivity in relation to water management efficiency systems and/or farming systems research site. The Crops Division of BARC will establish the contacts with Universities or institutions to get the services of the scientists for this sabbatical.
- * One soil scientist will perform detailed soil surveys of these cropping systems/farming systems research project areas. The scientist will prepare soil maps of the project areas containing information about soil series and their chemical and physical properties. The Soil Fertility Division of BARI will elaborate in these studies.

** Scholarships

\$ -0-

5. Contract Research

\$ 5,175

* The Crops Divisions of BARC will prepare 3 new research projects in FSR in collaboration with the staff from the participating institutes and IADS Specialists. Design, Approval and Implementation Process will require most of 1984-85. Consequently a zero amount is Budgeted the fiscal year 1984-85. These projects are to be funded by World Bank.

* The Farming Systems Specialist, and Associate Production Agronomists posted at Ishurdi, Jessore and Jamalpur will provide supervision to 3 on-going contract research projects funded by USAID. (Funds committed for on-going projects).

\$5,175

6. Commodities

\$ 97,000

* Committed costs for equipment ordered during 1983/84.

\$97,000

2* Laboratory and field equipment to order in the present fiscal year will include: seed germination test kits (20), portable typewriters (20), desk calculators (20), seed moisture testers (20), climatological instruments (pluviometers, max-minimum thermometers, hygrometers), mimeograph machine (6) (manual), Spring balances (20), Heavy duty staplers (50), Staples 100 boxes, Tack boards (cork), Bicycles (12), Polaroid Cameras (20), Polaroid films 100 boxes.

Estimated cost: \$34,000 subject to shifting of funds from another Budget line item.

TOTAL: \$471,000

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- ^* Translation, printing and distribution of 5000 copies of the Bengali version of Agricultural Research in Bangladesh.
- ^* Production and printing of 3000 copies of the selected proceedings of the first National Symposium on Agricultural Research.
- ^* Production, printing and distribution of 2000 copies of the second English edition of Agricultural Research in Bangladesh.
- ^* Production of the Bengali version of the BARC slidefilm program plus a slidefilm on the agricultural research process.
- ^* Subscriptions to agricultural science journals to be assigned to libraries of the research system as appropriate; selections of titles to be made by Bangladesh scientists and IADS Specialists to fill gaps in current literature availabilities.
- ^* Production and distribution of 3000 copies of the revised edition of This is BARC.
- ^* Various Video Equipment

Note: ^* Implementation and procurement is dependent upon transfer of funds from another budget line item. Estimated cost required \$50,000

Total

\$185,860
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AGRICULTURAL ECONOMICS AND SOCIAL SCIENCE

INTRODUCTION

The purpose of this program area of the Project is to strengthen the agricultural economics and social science research as an integral component of the overall research program of the national agricultural research system. The Member-Director (Agricultural Economics and Social Science) coordinates this program area of the Project.

PLANNED ACTIVITIES

1. Development of a standardized methodology for the collection, storage and analysis of socio-economic data and support for research projects. This activity will be strengthened during 1984-85 through training courses and workshops. The data handling capabilities of Bangladeshi agricultural economists and social scientists will be upgraded through the following activities:

- Use of consultant for 2 weeks.
- Training in experimental design by a consultant for 4 weeks in the first quarter.
- A 3-week course by three consultants in "Survey Methodology".
- A course on "Analysis of Economic Research Data" will be presented by the Specialist at BRDA, Bogra, in July 1984. Participants will include RDA staff members in statistics, sociology and economics who are responsible for developing a similar course. Two further courses will be conducted at BRDA/BARD. The initial course, conducted at GTI/BAU in May 1984, will be evaluated and revised in the first quarter, and will be presented 3 times during 1984-85 at GTI/BAU. Plans are to include potential trainers for the Extension Training Institutes of the Directorate of Extension, and BARD at Comilla.
- A 4-weeks short course, handled by a consultant on "Multiple Regression Analysis" will be presented to a group of Bangladeshi agricultural economists during March-April 1985.

- A course in "Elementary Parametric Statistics" will be developed locally and presented in March.
 - Two professors of mathematics from a national university will be hired as resource persons to conduct a 4-weeks course on "Matrix Algebra" as a prerequisite to the "Multiple Regression Analysis" course.
 - A consultant will present a 4-weeks course on "Agricultural Project Analysis".
 - A local consultant will conduct a second course on "Applied Cartography".
 - Three consultants will present a 4-weeks course on the "Application of Statistics in Agricultural Research" in September 1984.
 - A 2-week course on "Application of SPSS in Microcomputer for Social Science Research" will be conducted by a consultant during the second quarter combined with general computer instruction funded under Research Systems Management.
 - Workshops on "Partial Budgeting in Agricultural Research" conducted by the Specialist will be used to train the agricultural economists to prepare technical papers, and to use this technique in fertilizer trials, cropping patterns, variety trials, and seeding rate experiments.
2. Establish and evaluate a computerized data base for socio-economic with physical facilities, including a computer system.
 3. Initiate policy studies related to agro-economic and social development.

The following specific activities will be carried out in 1984-85 to implement this area of work:

- Research will be continued by a consultant on the role of rural women in the context of their contribution to agricultural development and the household economy. This will be done during two-weeks in January and the two months of June and July (part of this time of the consultant will be used in research related to Farming Systems, as mentioned later).

- Research will be continued by a consultant on a) economic decision-making among landless and marginal farmers, and b) the relationships between land ownership, land fragmentation, and rural-urban migration. This will be implemented in two weeks in January and the months of June and July.
 - A consultant from Thamassat University in Bangkok will assist in linking micro-level activities to several policy-oriented studies relevant to agricultural development issues.
 - Two persons will take a 3-weeks special course in the USA designed for the leaders of the "Role for Women" project (November-December 1984).
 - Two new contract research projects: 1) A socio-economic analyses of production and marketing of oilseeds and 2) rural-urban migration. Both will be for two years.
4. Strengthen research on the socio-economic aspects of irrigation water management (This activity will involve participation of the Water Management Program area). All costs will be applied against Water Management Program Area. It will be pursued through:
- Development of an annotated bibliography on irrigation water management, an on-going project, which is expected to be completed by end of December. One senior and three junior consultants will continue working on it.
 - A local consultant will assist the Member-Director (Agricultural Economics and Social Science), BARC, in socio-economic aspects of the irrigation and water management research program (9 person months).
 - Two local consultants will be used to complete the analysis of irrigation economics data data initiated in 1983-84. Their consultancies will be for 9 person-months each.
 - Two Bangladeshis will participate in a short course on "Irrigation Water Production Functions" at Utah State University, International Irrigation Center.

5. Strengthen research on the socio-economic aspects of farming systems research.

- A consultant will continue research into farmers' perception of farming systems and the adoption of new technologies. This will take place for two weeks in January and the months of June and July.
- Three persons will participate in the ICRISAT 3-weeks training course on "Economics of Farming Systems".
- A study tour will be arranged (tentatively in December and January) on the Indonesian Cropping Systems program.
- A scientists from IRRI will conduct a 3-weeks short course on "Economic Analysis of Cropping Systems Research Data". This is scheduled for early 1985.
- A two-year contract research project will be started on the socio-economic aspects of cropping systems research and development.

6. Other activities

A consultant will be employed in the first quarter to assist the Member-Director (Agricultural Economics and Social Science) strengthen research work on farm credit (4 person months).

PROJECT SUPPORT

1. Specialists and Consultants

\$138,025

The IADS Agricultural Economist-I Specialist will assist in implementation of the planned activities. The Member-Director (Agricultural Economics and Social Science), BARC, coordinates his activities. (Person-months 12.0.

** Consultants

- * Anthropologist to continue research on Farming Systems and role of women in agricultural development. Person-months 2.5; 0.5 in January plus June and July.
- * Anthropologist to continue research on economic decision-making among landless, and rural-urban migration. Person-months 2.5; 0.5 in January plus
--- June and July.
- * Consultant to upgrade data-handling capabilities of agricultural economists. Person-months 0.5.
- * Specialist to help link micro-level activities to policy-oriented research. Person-months 0.5.

- * Outlining scheme for training in experimental design. Person-months 1.0.

- * A three-week course on "Survey Methodology"; 3 consultants; Person-months 2.25.

- * Strengthening research on marketing. Person-months 4.0.

2. Local Support

\$none

** Local Consultants (funded by Water Management)

- * Annotated bibliography on irrigation; one senior consultant and three junior consultants for 6 months (July-December). Person-months $3 \times 6 = 8$.
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* Support to Member-Director
(AEISS) in irrigation and water
management. Person-months 9.0.

* Analysis of irrigation economic
data. Two local consultants for
9 months. Person-months
 $2 \times 9 = 18$.

3. Overseas Training

\$ 85,550

** PhD in USA

\$ 14,000

* One on-going at Purdue
University (January 1984-
December 1987). Person-
months in 1984-1985
12.0.

\$ 14,000

* One intended in Agricultural
Economics with emphasis on
development economics for
September 1985-September
1989. Person months in
1984-1985. 0.0.

\$ NONE

** PhD in TWC

\$ NONE

** MSc in USA

\$ NONE

* Two MSc in Statistics intended
for September 1985-March 1988.
Person-months in 1984-1985.
0.0.

\$ NONE

* One MSc in Applied Anthropology
for September 1985-March 1988
Person-Months in 1984-85 0.0

\$ NONE

** MSc in TWC

\$ 9,400

* One student at UPLB,
Philippines on-going April 1983-
October 1985. Person-months in
1984-1985. 12.0.

\$4,700

* One student at UPLB, Philippines on-going March 1984-September 1986. Person-months in 1984-1985. 12.0. -----	\$4,700
** Up to 6 months in USA.	\$15,000
* Two persons for 3-week course on "Role of Women". November-December. Person-months $2 \times .75 = 1.5$. ---	\$7,500
* Two participants in course on "Irrigation Water Production Functions". Person-months $2 \times 1.0 = 2.0$. ----	\$7,500
** Up to 6 months in TWC.	\$19,650
* Three researchers for 2-month IRRI course "Agro-Economic Research Training (October-November). Person-months $3 \times 2 = 6$. --	\$10,500
* Three persons in 3-weeks course at ICRISAT on "Economics of Farming Systems". Person-months $3 \times .75 = 2.25$ ----	\$ 4,800
* One person for rural development course in Turkey. Person-months 1.0. ----	\$ 2,500
* 3 participants in 8 weeks training of Agricultural Statistics at Los Banos during February 1984 cost recorded in 1984-1985.	\$ 1,850
** International Conferences	\$11,000
* One senior staff member from BAU to annual meeting American Agricultural Economics Association. August Person-months 0.5.	\$ 4,000

- * Other international conferences not specified. Two persons, each 0.5 person-month. Person-months 1.0. \$ 7,400

** Staff Travel \$16,500

- * Visits to international centers such as ICRISAT and IITA. Two persons, 0.5 person-months each. Person months 1.0. \$ 4,000

- * Tour of Indonesian cropping systems research program. December-January. Five persons for two weeks. Person months $5 \times .5 = 2.5$. \$ 6,250

- * Mid-level social scientists orientation tour to international and regional centers in Asia. Five persons for two weeks. Person-months $5 \times .5 = 2.5$. \$ 6,250

4. In-Country Training \$ 81,800

** Short-Term Courses \$78,000

- * "Analysis of Economic Research Data" course. 25 participants. 4 courses of 10 days total duration. \$ 1,000
- * 4-weeks course on "Multiple Regression Analysis". March-April. 10 participants. \$11,500
- * 4-weeks course on "Elementary Parametric Statistics, March. 20 participants. \$ 8,000
- * 3-weeks on "Applied Matrix Algebra" with 25 participants. \$ 3,000
- * 2-weeks course on "Elementary Price Analysis". October, by the Specialist. 20 participants. \$ 1,000

- * 3-weeks course on "Economic Analysis of Cropping Systems Research Data". 20 participants. \$10,000
- * 2-week course on Economics of livestock production in collaboration with Livestock \$ 2,500
- * 4-weeks course on "Agricultural Project Analysis". 20 participants. \$15,000
- * 2-weeks course on "Applied Cartography". 15 participants. \$ 1,000
- * 4-weeks course on "Application of Statistics in Agricultural Research" September. 30 participants. \$25,000
- * 2-weeks course on "Application of Micro-computers for Social Science Research" Second quarter; under Research Systems Management. \$ -0-
- ** Discussion/Seminars \$ 2,000
- * Workshop on "Partial Budgeting in Agricultural Research".
Dates -----, Participants -----, \$ NONE
- * Series of workshops on methods of analyzing socio-economic data from cropping systems research sites. Duration of two weeks with 20 participants. \$ 2,000
- ** Sabbatic Studies \$ 1,150
- * Study of "Socio-Economic Impact of Flood" to be undertaken by Bangladesh Academy for Rural Development in Comilla. \$ 500

- * Six persons from research institutions or universities will be offered sabbatic leaves for 6-months duration. Expected to begin June 1985. Person-months in 1984-1985. 0.0.

\$ NONE

** Scholarships

\$ 650

- * One MS Scholarship at BAU for period of February 1984-July 1985. Person-months in 1984-1985 12.0.

\$ 400

- * One MS scholarship for study at BAU. Person-months in 1984-1985 6.0.

\$ 250

5. Contract Research

\$ 59,000

- * A socio-economic analysis of production and marketing of soil seeds - 2 years. Support for 6 months in 1984-85.

\$ 4,000

- * Cropping systems research - 2 years. Support for 6 months in 1984-85.

\$ 4,000

- * Rural-urban migration - 2 years. Support for 6 months in 1984-85.

\$ 4,000

- * A Socio-Economic Research on Jute Farming in Bangladesh (July 1982-June 1985). Person-months in 1984-85 12.0.

\$17,950

- * A Socio-Economic Study of Tubewell Irrigation in Selected Areas in Mymensingh (January 1984-June 1985). Person-months in 1984-1985 12.0.

\$ 14,050

- * Role of Rural Women in Technology Adoption (January 1984-June 1985). Person-months in 1984-1985 12.0.

\$ 15,000

5. Commodities

\$ 17,900

Commodities include Baby Taxi,
Computers and Books committed in
1983-1984 totalled \$17,900

TOTAL

\$382,275

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CROPS RESEARCH

A. CROPS

INTRODUCTION

This component of the crops program (the other components are agronomy and horticulture) is to assist BARC in planning, implementing and evaluating coordinated crop improvement programs with the participating institutes. An important element in the coordinated programs is a close linkage with the farming systems program and the non-commodity projects. This component is also expected to provide through BARC, assistance to BADC in the seed production program.

The Member-Director (Crops) will coordinate the overall activities in this component of the crops program, and the IADS Crops Specialist will work with him in achieving planned activities.

Under this component of crops, support will also be provided in a somewhat broader context--assistance to the Chairman of BARC in development, planning, monitoring and evaluation of BARC-supported programs. Such support will be primarily through the Crops Specialist.

PLANNED ACTIVITIES

1. Strengthening of Crops Research Activities

A contract research program on grain legumes (blackgram and lathyrus) has been funded and supported Phase I and Phase II. The program was recently evaluated. Based on the progress made it was decided to drop four components of this program and support the remaining four upto 1986. The components to be supported are:

- (a) Breeding at the Institute of Nuclear Agriculture
- (b) Soil microbiology (N-fixation) at the Bangladesh Agricultural University (BAU)
- (c) Plant Pathology at BAU
- (d) Biochemistry (Toxin studies) at BAU.

Besides the financial support, (£24,000) to be provided for labor, chemicals, field inputs etc., technical assistance will be rendered by the specialist and the pulses consultant. Other support in the form of germplasm acquisition, holding of coordination meetings, printing of reports etc, will continue from BARC and the project office. It is expected that by the end of the extended period this Contract Research Project will yield valuable returns in the form of disease resistant varieties, N-fixing strains of rhizobia and non-toxic lines of Lathyrus.

Exotic germplasm of various oilseed and legume crops is being obtained from various international institutes and germplasm banks such as USDA (Beltsville). This support will continue to be provided, particularly in case of oilseeds.

2. Improve the Efficiency of Manpower

The PhD degree trainees in the US will return near the end of 1986. They are expected to enrich the manpower in the field of minor cereals. No further degree training in USA or in the Third World Countries is planned. In the coming eighteen months emphasis is to be laid upon in-country training. The following training opportunities are planned:

Two short term (3 week) courses on Breeding Methodology in self-pollinated and cross-pollinated crops will be conducted in early 1986. 20-25 scientists of SO and SSO level will attend these courses. Methodology of crossing and field management, selection of parents, collection and inference of data, theoretical considerations in data processing will be discussed. Practical training will be given in the field. Training courses will be conducted with the help of two short term consultants from Cornell University and local trainers. The IADS Crops Specialist and Member-Director Crop will supervise the courses.

To bring the generated technology on specific crops to the farmers' doorstep, research and extension linkages will be strengthened through provision of short term training courses to subject matter extension specialists. Four such training course on maize, oilseeds, pulses and tuber crops of two weeks duration each, have been planned to be conducted between November and February. These courses will bring in local trainers from diverse field who will give a series of lectures on specific topics to be decided by the Member-Director Crops and Crops Specialist.

Two senior scientists will visit the institutes involved in pulses and oilseeds research in Asia (India and China), in 1985, for three weeks each. These study

tours will help them learn about the latest development in their fields of specialization and help them establish contacts with the counterpart researchers in the respective institutes.

Three three-day workshops, on spices, oilseeds, and roots and tuber crops, respectively, have been planned. They will be held at BARC in January-February under the management of Member-Director Crops. Purpose is to assemble 20-25 scientists from related fields in each of these areas to review the results and research methodology. The purpose is to draw time bound inter-disciplinary programs for the coming three years and assess the quantum of assistance and inputs required for the same.

3. Updating the Information Base

An important issue to which government's attention has been drawn is the recognition of research needs of hitherto neglected agro-climatic zones, namely the Barind and Haor areas, saline areas in the South, and the Chittagong Hill Tracts.

A number of areas have been recognized in the Crops sector wherein basic field data are required to help plan research strategies for future. Two such areas in which surveys have been designed and approved at this stage are -

- * Barind Area development

- * Feed and fodder potential of conventional field crops and various fodder species.

- (a) Barind Survey: An expatriate consultant has been hired to prepare a "working paper" on Barind. Working in association with the Member-Director and Crop Specialist, he will submit a list of recommendations on the Research Strategy on Barind Development. A short agro-ecological cum socio-economic survey will be conducted. The specialist will work for 5 months on this problem, spending more than half of his time in the Barind area itself.
- (b) Fodder Crops: A local consultant has been hired for 8 months to survey the fodder potential of grain and legume crops and also look into unconventional sources of fodder and feed. He will submit a comprehensive report in March 1985. Based on his recommendations, a fodder improvement programme will be drawn up for the coming 3 years. This area is highly interdisciplinary in nature and draws funds and know how from crops, stock, water management and farming-systems sectors.

4. Help Strengthen Research Capabilities

Provision of necessary equipment and commodities is an important means of helping improve the working efficiency of institutes. A list of equipment has been drawn up to help the constituent institutes of BARC to perform field and laboratory research more efficiently. These equipment are to be shared by four constituent institutes namely BARI, BINA, BAU and BJRI.

5. Program Development and Planning

Assistance will be provided to the Chairman of the Council and the Ministry of Agriculture in matters pertaining to planning, monitoring, evaluation and preparation of various working papers on policy issues. The IADS Crops Specialist has assisted in the preparation of the National Agricultural Research Plan and Diversification Strategy; monitored and evaluated various reports and donor proposals and written several working papers. During the first quarter, the specialist will prepare a working paper for the Ministry of Agriculture on 'Project Evaluation Mechanisms for Funding--Scoring Methods'. These inputs to BARC's activities are significant. Similar additional unforeseen responsibilities are likely to be assigned to the specialist.

PROJECT SUPPORT

1. Specialist and Consultant \$156,275

** Specialist

- * One Crops Specialist posted at BARC to help Member-Director (Crops) support the activities of this program. (12 man-months in 1984-85).

** Consultants (18 person-months)

- * One pulses consultant, already stationed at Ishurdi Regional Station to help establish the National Pulses Program recently shifted from Joydebpur (8 man-month).

- * One oilseeds consultant, to be fielded during the second quarter, to evaluate the National Oilseed Improvement Program and suggest necessary guidelines for a time-bound field program (4 man-month).
- * One dry-farming consultant to be fielded in the first quarter to develop a working paper and a detailed workplan for Barind area survey and research project (5 man-month).
- * One local consultant to look into various aspects of Forage and Feed production in Bangladesh. He will identify research priorities and program areas in this field. The consultant was hired in mid 1984 and will conclude his findings by the end of second quarter (8 person-months in 1984-1985).

2. Local Support

NONE

3. Overseas Training

\$ 24,700

** PhD in USA

\$ 10,000

- * One-on going at North Dakota in Plant Breeding: Cereals (August 1983-August 1987). Person-months in 1984-1985 12.0.

\$ NONE

- * One in Plant Breeding-Pulses and Oilseed Planned for September 1985-September 1989. Person Months 1984-85 0.0

\$ NONE

** PhD in TWC

\$ NONE

** MS in USA

\$ NONE

** MS in TWC

\$ 4,700

* One on-going at CLSU,
Philippines, (May 1983-
October-1985). Person-
months in 1984-1985
12.0.

** Upto 6 months in USA

\$ 3,850

1983-1984 committed costs of
four participants in various
training courses. Cost to be
recorded in 1984-1985.

** International Conferences

\$ NONE

** Staff travel

\$ 6,150

* 3 weeks study tour for 10
scientists to visit TWC
(India and Thailand) Oilseed
and Pulses Programs (1
person-months in second
quarter).

4. In-Country Training

\$ 19,075

** Short-Term Courses

\$ 16,500

* Two short term courses in
breeding methodology in self
and cross-pollinated crops
(2-3rd quarter) for SO/SSO
level scientists. Two weeks
with 20 participants each.

\$ 4,000

* Four short term courses on
pulses, Oilseeds, maize and
tuber crops, respectively for
Subject Matter Specialists of
Extension Department (2 & 3rd
quarter). Two weeks with
twenty participants each.

\$ 10,000

* Three three-day workshops on
spices, oilseeds and root and
tuber crops improvement (3rd
quarter).

\$ 2,500

** Sabbatical Studies \$ 1,375

* Two in plant breeding, one at BAU and one at BARI. Beginning 2nd and 3rd quarter (12 person-months 1984-85).

** Scholarships \$ 1,200

Five MS degree students are expected to begin March 1985-August 1986. Person-months in 1984-1985 $5 \times 6 = 30.0$.

5. Contract Research \$ 12,000

** Support for four components of coordinated Pulses Improvement Program at BAU and INA.

6. Commodities \$ 61,500

* Field and Laboratory equipment to be provided to BARI, BJRI, BAU and INA to improve their analytical and field plot techniques. (Detailed lists prepared in consultation with the end users). \$ 61,500

* Additional requests for purchase in 1984-1985. Estimated at \$22,800 if funds are reallocated from another source or line item. NONE

TOTAL \$273,550
=====

B. AGRONOMY (CROPS)

INTRODUCTION

The purpose of this program area is to strengthen the agronomic component in production-oriented multidisciplinary and multi-location research programs on important food crops. This requires building capabilities to both carry out on-station and on-farm research. The IADS agronomist is based at BARI under the overall coordination of the BARC Member-Director (Crops).

PLANNED ACTIVITIES:

1. Strengthen research in key areas and new crop programs.
 - a) Assess the role of the Agronomy Division (BARI) in research on dryland agriculture, with application especially in drought-prone areas. A consultant will be used for the period October to December to assist in planning the research role and will present a program proposal.
 - b) Upon receipt of, approval and funding of a contract research proposal, a coordinated project of on-station and on-farm research and extension of maize production practices will be inaugurated. The proposed project under the On Farm Research Division (BARI), includes several on-station sub-projects to be carried out by the Agronomy Division (BARI). The contract research proposal was first presented to BARC in the first quarter of fiscal 1983. The project is planned for three years to begin with Rabi season of 1984, if approved in time.
 - c) To assist the Agronomy Division in its coordination with the On Farm Research Division, and particularly in developing a research program with maize production, a consultant will be used for one month. This activity will be initiated subsequent to the inauguration of the contract research activity described above, probably in February.
2. Organize and improve the research land and land use of the Agronomy Division (BARI) under a pilot program.
 - a) Remove physical restraints to crop production (subsoiling and drainage: started May 1984; to be completed July)

- b) Organize an allocation and record system for re-land use with the BARI Agronomy and Farm Division research officers (September).
 - c) Under the direction of agronomy research officer in-service training to fieldmen and their managers on improved research field operational procedures (November).
- 3. Improve the capabilities of research officers, emphasizing orientation to farm production problems through training at the advanced degree level, apprentice-type skills training, attendance at international conferences and short duration courses.
 - a) Advanced degree training, in the U.S., is needed in areas of dryland agronomy, weed science and seed technology. Support for two PhD's and two MS candidates will be sought from other donors.
 - b) Agronomic research/extension skills training for five junior scientists; 3 months each at selected USA sites. (March - May).
 - c) International conference on research farm mechanization. Two scientists, 3 weeks each (Ireland) (July).
 - In-service workshops and short courses on statistics and research plot techniques. Conducted jointly with Soil Science, Ag. Econ. & Agronomy (Sept. and June).
- 4. Improve the ability to prepare research and training programs, to conduct controlled climate research in drought and saline tolerance and other agronomic research, and to strengthen the capability to carry out effective statistical design and analysis, certain references will be provided and facilities furnished.
 - a) Procure up to 100 up-to-date references in areas of agronomic research.
 - b) Procure a design, obtain approval for design and provide a glasshouse/screenhouse/headhouse of approximately 1500 ft² area.
 - c) Procure microcomputer, statistical package and other accessories for the use of Agronomy Division (BAR)

PROJECT SUPPORT

1. Specialist and Consultants:		\$53,725
** Specialist 1 (Agronomist) 5 person-months		
** Consultant		
* To assist Agronomy Division to assess its role in research in dryland agriculture of draught-prone areas. (Oct.- Dec.). 3 person-months		
* To assist in integrating agronomy and OFRD maize production programs. (after funding of maize contract research project). Person-months 2 x 1.0 = 2.0		
2. Local Support		NONE
3. Overseas Training		\$68,900
** PhD in USA		\$11,300
* One students in Agronomy (Aug/83-Aug/87). Person Months in 1984/85 12.00	NONE	
* Two PhD in Agronomy expected Sep/85-Sep/89. Person Months in 1984/85 0.0		
** MS in USA		\$10,700
* One student in Agronomy (Aug/83-Feb/86). Person Months in 1984/85 12.0		
** MSc in TWC		\$4700
* One student in Agronomy (May/83-Oct/85). Person Months in 1984/85 12.0		

** Upto 6 months in USA:		\$32000
Research/extension skills training 5 Junior scientists (March-May). Person-months $5 \times 3.0 = 15$		
** Upto 6 months in TWC		\$3200
2 participants in Seed Technology Training at UPLB/Philippines for two weeks August 12-August 31, 1984. Persons Months in 1984/85 1.0		
** International Conference:		\$7000
Research Farm Mechanization, Ireland, 2 scientists, 3 weeks (July) Person-months $2 \times .75 = 1.50$		
** Staff Travel		NONE
4. In-Country Training:		\$4235
** Short course on statistical training and research techniques, jointly with Soil Science and Ag. Economics (Funding via Ag. Economics)		NONE
** Sabbatical Studies		\$575
* One in Agronomy (Feb/84-Mar/85). Person Months in 1984-85 3.0		
** Scholarships		\$3660
* One PhD at BAU (Feb/84-Feb/88). Person Months in 1984/85 12.0		
		\$610
* Four PhD at BAU expected Feb/85-Feb/89 (acceptance in process). Person Months in 1984/85		
		\$1850
* One MS student at BAU (Nov/83-May/85). Person Months in 1984/85 11.0		
		\$ 240

- * Four MS students expected for May/85-Oct/86.
(Application in process) \$ 960

5. Contract Research:

\$20,000

- ** On station and on farm, research and extension of maize production practices. Expected duration Nov/84-Nov/87
Total Budget Estimates \$150,000. Months in 1984-85 7.0

6. Commodities

\$92,500

- * Includes texts and references for improving research and training programs, approximately 75.
- * Procure microcomputer, statistical package and ancillary equipment for statistical improvement. (June)
- * Agricultural Equipment
- * All items ordered in 1983/84 and cost to be in 1984/85. Recorded.

7. Construction

NONE

- 1* Procure a design and approval for outdoor climate control facility (glasshouse/shadehouse) for drought and saline tolerance research. 1-1500 ft. (June)
Estimated cost \$25,000. Implementation is subject to shifting of funds to "Construction" line item from another Budget line item.

Total

\$239,360
=====

C. HORTICULTURE

INTRODUCTION

As in most developing countries, vegetables research in Bangladesh has received little attention relative to that given to cereals and grain legumes. Most vegetables research is under BARI, where the IADS Horticultural Specialist is located. However, as with other crops under project support, overall coordination of vegetables research is the responsibility of the Member-Director (Crops), BARC. The objective of this program area is to strengthen research on vegetables, including varietal improvement, cultural practices, quality of the product, post-harvest technology and seed production.

PLANNED ACTIVITIES

1. Determination of Research Priorities.

As a basis for determination of research priorities, survey trips will be made to assess production practices and cropping patterns followed by vegetable growers.

2. Development of a Long-Term Research Program

A consultant (vegetable breeder) will assist in development of breeding programs for selected vegetable crops. He will be needed for three months, beginning about January 1985.

Scientists from the Vegetable Section, BARI, assisted by the IADS Horticultural Specialist, will make germplasm collection trips to important vegetable production areas throughout Bangladesh. This work will be done in association with the surveys to assess vegetable production practices and cropping patterns.

3. Improvement in the Quality of Research

The Vegetable Section, BARI, will encourage the IADS Specialist to work with its individual scientists to improve experimental designs and field plot techniques, and to use him to participate in the design and implementation of experiments. Scientists of the Section will

participate in some of the statistics - field plot design short courses described under the program area "Agricultural Economics and Social Science".

Contract research proposals will be encouraged in three problem areas: (1) cucurbits, 2) intensive vegetable cropping, and 3) seed quality of vegetables. These projects are expected to be initiated by the beginning of the third quarter.

4. Improve the Trained Manpower

This is probably the greatest deficiency in vegetables research - both in terms of number of researchers and in level of training.

A consultant will assist in developing breeding programs for selected vegetable crops, will also provide seminars and one or two short training courses.

Three scientists from the Vegetable and Fruits Sections of the Division of Horticulture at BARI will be sent for training in MSc programs in the Philippines, Thailand or India. Specific areas of study will be based on priority horticultural research needs.

Six scientists from BARI (central stations and regional stations) will participate in a 5-month training program entitled "Integrated Regional Training Course in Advanced Vegetable Production". It will be conducted at the Kampaengsaen Campus of Kesantsart University in Thailand, in cooperation with AVRDC. The course will be October-February.

Three study tours of about 4-weeks duration each will be designed for the PSO, Vegetable Section, PSO, Fruit Section and the Head of the Horticulture Division (all at BARI) to upgrade their administrative and research skills. This tour will be to 3-4 countries, and will involve if feasible, a national or international meeting.

A three-month course will be developed, to begin in January-February, in applied horticulture, including: cultural practices, basic field plot design, plant problem diagnosis, nursery management, and training techniques. The course will include 30 subject matter specialists in horticulture. It will be conducted primarily by consultants.

Upon completion of the horticulture laboratory, a training course will be conducted for scientists in the division on the handling and preparation of plant material, laboratory techniques, and operation and maintenance of the equipment. The IADS Specialist will assist in the course.

One vegetable specialist will be awarded a six-month's sabbatical study at BARI, Joydebpur. The subject will be selected, taking into account priority needs in vegetable research. Work should be initiated by the beginning of the third quarter.

Two MSc scholarships will be awarded to candidates within the national horticultural research system for studies in horticulture at BAU. Their studies are expected to begin 1985.

5. Improve Facilities for Vegetable Research

The Vegetable Section office, storage and laboratory facilities will be upgraded. A horticultural research greenhouse will be designed, and constructed at BARI.

6. Strengthen Research on Fruits.

While research on fruits is not specifically covered under the project, aspects of fruit and vegetable work in the Horticulture Division at BARI overlap. For example, on previously mentioned 4-month study tour outside of the Bangladesh includes not only the PSO of the Vegetable Section at BARI, but also the PSO of the Fruit Section, and the Head of the Division. Likewise, some of the facilities to be improved in the Division at BARI under project support, will assist both vegetable and fruit research. Thus, limited project support specifically for strengthening research on fruits is considered to be justified and desirable.

As stated, the PSO of the Fruits Section, BARI will participate in a 4-month study tour.

A consultant will be used to assist in assessing the present status of research on fruit crops, and make recommendations for strengthening it. He will also give one or more seminars and conduct one or two training courses.

7. Other

In the horticulture program area with assistance by the IADS Specialist, will strengthen the Horticulture Society. This will be primarily through assistance in the preparation of papers for the Society's journal.

PROJECT SUPPORT

1. Specialists and Consultants \$132,950

** Specialists

* Horticulture Specialist
based in the Horticulture
Division, BARI Person-months
12

** Consultants

* Vegetable Specialist (breeding)
Person-months 3.0

* Fruit Specialist for
development of Fruit Section,
BARI Person-months 3.0

2. Local Support

NONE

3. Overseas Training

\$ 40,150

** PhD in USA

NONE

* One students in
Horticulture-Vegetable
Crops intended for
Sep/85-Sep/89
Person Months in
1984/85 0.0

** PhD in TWC

NONE

** MSc in USA

\$11,400

* One student in
Horticulture
(Aug/83-Feb/86)
Person Months
in 1984/85 12.0

\$11,400

* Two students in
Horticulture-Vegetable
Crops are intended for
Sep/85-Mar/88.
Person Months in
1984/85 0.0

NONE

** MSc study in TWC

NONE

- * Two persons to be selected from Fruits and Vegetable Sections, BARI for training in Philippines, Thailand or India: Expected for June/85-Dec/87. Person-months in 1984/85 0.0
- ** Up to 6 months TWC \$ 25,000
- * Six scientists for 5-month program in Thailand on "Integrated Regional Training Course in Advanced Vegetable Production" October-February. Person-months $6 \times 5.0 = 30.0$
- ** International Conference NONE
- ** Staff Travel \$ 3750
- * Study tours for PSDs Vegetable and Fruits Section, and Head, Division of Horticulture, BARC. Person-months $3 \times 1.0 = 3.0$
- 4. In-Country Training \$ 29,630
 - ** Short-Term Courses \$ 28,000
 - * Three-month course in "Applied Horticulture" to begin January-February for 30 subject matter specialists. Person-months in 1984/85 3.0 \$ 25,000
 - * Training course of three weeks for about 25 local scientists on handling and preparation of plant material, laboratory techniques, etc. planned for second quarter. Specialist to be principal lecturer. \$ 3,000

** Sabbatical Studies		\$ 1150
* One fruit specialist and one vegetable specialist, each for a 6-months sabbatical at BARI, Joydebpur. Subjects to be based on priority research needs. Person-months in 1984/85 $2 \times 6 = 12.0$		
** Scholarships		\$ 1090
* One PhD scholarship in Horticulture, at BAU. Studies expected period of study in Feb/85-Feb/89. Person-months 1984/85 6.0		
		\$ 370
* Three MSc scholarships in Horticulture at BAU. Studies expected period of study in Feb/85-Aug/86. Person-months in 1984/85 $3 \times 6 = 18.0$		
		\$ 720
5. Contract Research		\$ 46,000
** Research and Development of Root Crops (12 months)		\$34,000
** Contract research projects estimated duration of twenty four months in:		\$12,000
* Cucurbits-estimated starting date March/85. Months of operation (1984-85) 3.0		
		\$ 4000
* Intensive Vegetable Cropping-estimated starting date March/85. Months of operation (1984-85) 3.0		
		\$ 4000
* Seed Quality of Vegetables-estimated starting date March/85. Months of operation (1984-85) 3.0		
		\$ 4000
(Note: Total budget available March/85-March/87 \$50,000 for all three Pprojects)		

6. Commodities and Construction

** Commodities

\$ 68,000

* Books and journals needed for horticulture at BARI and its regional stations. And additional equipment for laboratories and field facilities at BARI and regional stations. Lists to be developed during by November 1984. Budget estimate \$ 48,000 subject to shifting of funds from another Budget line item.

* 1983/84 Agricultural Equipment and Journals ordered will be purchased during 1984/85 total budgeted cost \$ 68,000

** Construction

NONE

* Horticultural research greenhouse at BARI funded under Agronomy.

Total

\$317,340
=====

LIVESTOCK

INTRODUCTION

Research on livestock is a relatively neglected area in the national agricultural research system. The position of Member-Director (Livestock) was filled only recently.

This program area is concerned with: 1) more precise identification of researchable constraints to livestock production and utilization, 2) identification of research priorities, 3) improvement in the competence of livestock research scientists, 4) improved facilities and increased support for livestock research, and 5) improved linkages between research, extension and livestock producers. Within BARC, the Member-Director (Livestock) has responsibility for overall coordination of livestock research within the national agricultural research system, and IADS Livestock Specialist will work with line in achieving planned activities.

PLANNED ACTIVITIES

1. Identification and more precise characterization of the major researchable constraints to livestock production and utilization.

Consultant (1 USA and 2 Local) will be used to carry out an in-depth study on the existing situation, characterize major researchable constraints to livestock and poultry production, and recommend short-term and long-term research priorities. (Dec-January).

2. Identification of research priorities.

On the basis of researchable constraints, research priorities will be identified. To this end, all scientists engaged in livestock research will be invited to participate in a discussion group in February on "Research Priorities in Livestock and Poultry".

3. Enhancement in the competence of livestock research scientists.

A major constraint within the national livestock research program is a lack in number and level-of-training of researchers. During the year the division will conduct a national in-depth survey of trained research manpower resources (degree holders in animal or veterinary sciences)

by program component areas, assess the present requirement short-term and make recommendations. The survey will be under the direction of a BARC ad hoc committee, and conducted by one USA and two local consultants. It will occur during the third quarter of the year (January-February).

The Member-Director (Livestock) and the PSO of that division will participate in the short-course "Management of Agricultural Research Facilities and Organizations" in Washington, conducted by the USDA from July 23 to September 7, 1984.

Three principal investigators of research projects and administrators of research programs will attend conferences and scientific meetings in their respective fields. It is assumed that each conference will be one-week duration, exclusive of travel.

About 20 scientists engaged in livestock research will be invited to participate in a workshop (2 weeks) on "Research Methodology in Livestock & Poultry" in March. One USA and one TWC consultant will assist in conducting the workshop.

Three scholarships (2 PhD and 1 MSc) will be provided to livestock scientists for study at BAU. They are expected to commence study during the third quarter.

The Director of Livestock Services, BARC Member-Director (Livestock), Dean of the Faculty of Animal Husbandry at BAU, Dean of Veterinary Sciences at BAU, Director of BLRI and the IADS Specialist will visit the Philippines, Thailand, Indonesia, Sri Lanka and India to study research institutes on livestock. This will involve three weeks in March-April.

4. Contract research

A new three year project "An Epidemiological study of calf diseases in Bangladesh" will be initiated in January, 1985. It will be headed by a scientist in the Livestock Research Institute (Mohakhali) Directorate of Livestock Services.

A local consultant will be employed for 8 months to study draft power requirements, availability and utilization in agriculture. Based on this study a comprehensive program on draft animal will be prepared (October-May).

5. Improvement in facilities for livestock research.

The division will interact with donor agencies and the Secretariat for Livestock and Fisheries in plans for establishment of the Bangladesh Livestock Research Institute.

6. Strengthening of links between livestock research and extension agencies and communicating the results of research to farmers.

The division will participate in the development of a national farming systems research program, and in its implementation.

BAU personnel, DLS Extension personnel, field assistants and farmers having an interest will be invited to attend 2-week short courses on:

- Cattle/Buffalo Production and Management
(Emphasis on Draft Power) - March
- Feed and Fodder Production and Utilization-April

Two consultants from Third World Countries will conduct these courses.

A short course on poultry production and management will be held in July. All commercial poultry farmers (40) will be invited in a 2-day workshop to review problems of commercial poultry farming and formulate research program and strategies (May).

PROJECT SUPPORT

1. Specialists and Consultants

\$ 66,000

- * The IADS Livestock Specialist will assist in implementation of the planned activities. Member-Director (Livestock), BARC, coordinate his activities. Livestock Specialist (the incumbent had to leave for medical reasons in June but is expected to be replaced by January 1985. Person months in 1984-85 6.0

** Consultants from USA

- * One Animal scientist (assisted by two local consultants) will study researchable constraints to livestock and poultry. He will also survey on trained manpower position and requirement. Person months (1.5 + 1.5) 3.0 December to February.

** Local Consultant

- * Two Animal scientists to work with USA Consultant for studying researchable constraints in livestock & poultry and for survey on trained manpower position and requirement. Person-months (1.5 + 1.5 x 2) = 6.0 Dec-Feb.
- * One Animal Scientist for 8 months to study draft power requirements, availability and utilization in agriculture. Person Months 8.0 October-May.

2. Local Support

NONE

3. Overseas Training

\$30,000

** PhD and MSc in USA

NONE

** PhD in TWC

\$5000

- * One student in animal science attending UPLB, Phillipines (May/83-May/87). Person Months in 1984-85 12.0

** MSc in TWC

NONE

** Up to Six Months in USA

\$11,000

* Short-course on "Management of Agricultural Research Facilities and Organization in Washington, D.C. USDA for two people. July-September 1984. Person Month in 1984/85 3.0

** Up to Six Months in TWC

NONE

** International Conferences

\$7000

* Provision for three principal investigators of projects and administrators to attend international scientific meetings in their respective fields. Each would spend about week at conference, plus travel time.
Person-months $3 \times .25 = .75$

** Staff Travel

\$7000

* Five persons (listed under "Planned Activities" 3) to review livestock research in 5 TWCs in January. Person-months $5 \times .75 = 3.75$

4. In-Country Training

\$47,950

** Short-Term Courses

\$33,800

* Two 2-week courses:
Cattle/Buffalo Production in March. Feed and Fodder Production in April. 20 participants in each course including BAU, DLS personnel, field assistant and farmers.

Note:

- * Two Animal scientists from TWC for conducting workshop on cattle/ Buffalo production and feed and fodder production and utilization in March and April. Person Months 2.0 \$31,300
- * One 2-week course on poultry production and management. 20 participants (Farm Manager) of DLS, BAU, BADC, July 84 \$2,500
- ** Discussions/Seminars/Workshop \$12,600
 - * 2 weeks workshop on research methodology in livestock and poultry, 20 participants. March 85.
- Note:
- * One Animal Scientist from USA and one Animal Scientists from TWC for conducting workshop on research methodology in livestock and poultry in March. Person Months 1.0 \$11,000
- * 2 days workshop of commercial poultry farm managers, 40 participants, May 85 \$800
- ** Sabbatical Studies \$575
 - * One on-going study at Dept. Marine Biology, Chittagong University for six months - to be selected begin in 1985/86
- ** Scholarships \$975
 - * Two PhD for study at BAU (Feb/85-Feb/89 expected). Person months in 1984-85 $2 \times 6 = 12.0$ \$735

* One MSc for study at
BAU (Mar/85-July/86)
Person-months in
1984-85 6.0

\$240

* Four in-country MSc
scholarships will be
provided to livestock
scientists for higher
studies in Animal and
Poultry Science at BAU.
The candidate will be
selected during this
period and the course
be started in 1985/86.

NONE

5. Contract Research

\$10,000

** A new three-year project
on Epidemiological study
of calf Diseases in
Bangladesh. To be initiated
in Jan. '85. To be Budget
Estimate \$ 75,000 Cost for
1984-85: \$10,000.00

6. Commodities

A list of equipment for
supporting livestock
research and strengthening
BARC Livestock Division
activities will be prepared
in 3rd quarter.

\$ 30,000

TOTAL

\$ 183,950
=====

FISHERIES (LIVESTOCK PROGRAM AREA)

INTRODUCTION

Fish plays an important role in our national economy. In the past little attention was paid in fisheries research under national agricultural research system. Recently a new division on fisheries was created under BARC. Member-Director (Fisheries) has the responsibility for overall coordination of fisheries research within the national agricultural research system.

PLANNED ACTIVITIES

1. Improvement of shrimp production practices. A survey on shrimp cultural practices in the coastal areas of Bangladesh will be undertaken to identify the existing shrimp production practices and its limitations. Based on the survey report, research proposal on shrimp production will be formulated. A local consultant will be employed for three months for conducting this work.
2. Enhancement in the competence of fisheries research scientists.

One 2-week training on Freshwater Aquaculture will be conducted for improving skill of the research and extension personnel of the Directorate of Fisheries. The course will be conducted jointly by DOF and BARC in the 3rd quarter.

One senior staff member from EAU/BARC/DOF will attend an international conference/seminar in the TWC in the 3rd quarter.

A 2-day workshop on Brackishwater Fisheries Research will be organized in the 4th quarter. Around 30 fisheries scientists/techno-administrators will be invited in the workshop.

All costs are funded under Livestock Program Area

PROJECT SUPPORT

1. Consultants

\$3,000

One local consultant will be employed for 3 month on shrimp culture practices in the 3rd quarter.

2. Overseas Training

\$3,500

One senior staff member of BAU/DDF/BARC will attend an international conference/seminar in the 3rd quarter for two weeks in TWC.

3. In-Country Training

\$5,500

* Short-Term Courses

One 2-week course on Freshwater Aquaculture in the 3rd quarter. 25 participants.

\$ 4,000

One 2-day workshop on Brackishwater Fisheries Research in the 4th quarter. 30 participants. \$ 1,500

TOTAL

\$ 12,000

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SOIL MANAGEMENT

INTRODUCTION

Soil is a complex, dynamic medium requiring a multitude of disciplines to unlock its secrets. The proper management and utilization of this expendable natural resource requires a great deal of research and thought cross pollination with other disciplines from industry, politics, and agriculture. Only through such a multidisciplinary approach will soil be used properly to meet the needs of today (crop or animal production, irrigation projects, urbanization, etc) and maintain its viability for future generations.

The overall Bangladesh soil management program is based on these premises. It has one objective and at present three broad activity areas.

The objective is to improve the national capability in all soil management areas.

Three broad priority areas of activity are listed below:

- a) Development of a national soil fertility evaluation and improvement program.
- b) Improvement of other soil management areas such as soil microbiology, soil physics, tillage practices, and soil and water conservation and management. As these are strengthened they will be integrated with each other, and the fertility program.
- c) As a and b (above) are achieved the various specializations will be able to offer services, research information and cooperation to the overall ARP II project's cropping/farming systems program.

The soil management program in Bangladesh is coordinated through the Member-Director, Soil and Irrigation, BARC. This program involves several institutes; namely, BARI, BRRI, BJRI, STRI, SRDI, DU, BINA, and BAU, in coordinated efforts in research education and extension. Several other national and international institutes/organizations are involved in parts of program activities.

PLANNED ACTIVITIES:

Overall program activities, expected outputs, and time frame have been well documented (a) Portch consultancy report, July 1982; (b) revised terms of reference for IADS soil specialist, communication M.A. Mannan to Director, BARI, November 1982; (c) position description and annual work plan, Portch to Daugherty, March 1983; and (d) Fitts consultancy report, April 1983.

Specific program activities have been reviewed and recommendations made (a) Blevins consultancy report, February 1984; (b) Sanders consultancy report, March 1984; (c) Hunter consultancy report, March 1984; and Beck trip report, July 1984.

Progress in achieving programmed activities has been successful and is documented (a) May 1983, external evaluation, and (b) May 1984, internal evaluation.

The following work plan assumes that the Bangladesh Soil Fertility Evaluation and Improvement (BSFEI) program will have in addition to the resident soil specialist, the following: (a) access to short term technical assistance as outlined, (b) financial support as programmed, (c) adequate cash flow, (d) approval of external training as programmed, and (e) continued project support from BAPC and affiliated institutes.

All activities of the soil specialist and short term technical assistance personnel will be conducted with Bangladeshi counterparts, and with other IADS specialists when practical. Emphasis will always be on the development of a national capability. All research will be conducted with the farming systems philosophy in mind.

The present plan builds upon past achievements in the overall program, emphasizes areas of continued work, and introduces new areas of activities. Many of the activities described below will take place simultaneously during the period July 1, 1984 to June 30, 1985.

1. Development of a national soil fertility evaluation and improvement program (BSFEI).

The soil fertility evaluation and improvement program has six major components. These are a) sampling procedures and handling, b) laboratory development and analysis, c) data interpretation, d) recommendations development, e) research, and f) out-reach. These must operate simultaneously within the program.

Representative samples of both soil and plant materials are imperative. Work will continue during the year on determination of methodology of sampling procedures, and handling and storage. Personnel in the soils program area will be trained in methodology and procedures. Publications will be made on sampling and sample handling.

Laboratory facilities are required for analysis of samples. During the year the model high-capacity soil, water and plant analysis laboratory at BARI will be completed, and be operating at maximum capacity. Facilities will be improved at other institutes. Emphasis will be placed on reliability of analytical results. Training will be provided in management, maintenance and research and continued development of the analysis component of the BSFEI.

Interpretation of the results of analyses is the critical step in making the output of the laboratory relevant to the farmers needs. Improved recommendations will be made on plant nutrient requirements, fertilizer needs, timing and methods of application within various cropping systems.

A revised fertilizer recommendations guide for extensionists, researchers and some farmers will be completed. Activities will be initiated for the bi-annual up-dating of fertilizer recommendations, making greater use of the correlation of sample analysis and crop response data. Training of extension and outreach personnel will be provided in the use of fertilizer recommendation guide sheets.

Soil fertility research is essential in the development of BSFEI. The research to be done this year has laboratory (improved analytical procedures) greenhouse (basis for approximation of laboratory - field results correlation, and for field research), and field components. This research will be supported through contract research (8 on-going projects, plus new ones planned - see details under "Contract Research" in major section on Project Support). More on-farm small research projects will be implemented in cooperation with farming system research personnel.

Getting the information generated by the program and put into use on the farm is an important component. Activities will include development of publications, participation in farmers' meetings, field days, and training programs. A slide set will be produced to promote the program and its concepts.

Improvement in Other Soil Management Areas

Soil management disciplines (including soil microbiology, soil chemistry and mineralogy, soil physics) as related to

tillage, water management, and soil conservation are important parts of on-going research in Bangladesh. The soil management program will take an active part in working with these projects.

During the year the soils program will: a) complete the X-ray diffraction analyses (done in the USA) in order to have a better understanding of the mineralogy and chemistry of the major soil series; b) initiate contract research activities on minimum tillage; c) initiate soil conservation activities in the Hill Tract (initial visit with possible subsequent use of consultant); d) continued coordination of NIFTAL - BNF activities (evaluation to be made of the work to date, with recommendations); and e) incorporation of a water management component into some fertility research trials (in cooperation with the Water Management program area).

3. Integrating soil management and soils-related activities into the ARP II project's cropping/farming systems research.

The soils program area will interact with the farming systems research program area by a) offering analytical services of the laboratory to FSR scientists; b) cooperative research projects; and c) increased use of data generated by the soils program as one of the important components of FSR.

4. Other activities in which the soil management program and its personnel will be continually involved.

These activities include: a) work with the National Soil Fertility Advisory Committee; b) work with the Soil Science Society of Bangladesh; and c) preparation of project assessments and other project-related documents.

These activities are designed to bring a closer working relationship between professionals and others involved in agricultural developments, as well as promote the soil management program's objective.

PROJECT SUPPORT

1. Specialists and Consultants

\$142,700

** Soil Specialist, Person-months
1984-85 12.0.

** Consultants

Estimated Totals 8.5 person-months.

The soils management program has three distinct consultant activities. These are
a) follow-up on past consultant activities, b) identifying needs and persons for specific new activities, and
c) coordinating continuing consultancies and local activities of consultants not funded under Phase II.

It is anticipated that consultants will be required as follows:

* Follow-up consultancies:

1. Dr. Larry Sanders - Maximum yield concept research and training program, 2-3 weeks, January-February 1985.
2. Dr. Robert Blevins - Minimum tillage research and training program, 2-3 weeks, December-February, 1984-85.
3. Dr. S. Chowdhury - BNF specialist to assist in BNF program evaluation, 2 weeks, September 1984. (Local Consultant).
4. Dr. Arvel Hunter - Laboratory systems training course, and evaluation, 6 weeks, October-December 1984.
5. Dr. Leonard Mattick - Instrumentation training, 5 weeks, March-April 1985.

* Consultants in new areas:

1. Dr. Larry Nelson - Statistics program evaluation (in cooperation with Agricultural Economics), 4 weeks, July-August 1984.

2. Dr. Douglas Beck - Biological Nitrogen Fixation program evaluation, 2 weeks, September 1984.
3. Unidentified - Overall program review, 2 weeks, February-March 1985.
4. Others as identified by program need 4-8 weeks.

* Continuing consultancies:

1. Dr. Douglas Beck - NITAL-BNF project, 4 weeks.
2. Dr. Robert Davis - NITAL-BNF project, 3 weeks.
3. Dr. G. Kemmler - Kali-Salz - IP1 project 2 weeks.
4. Various from CIDA - Potassium project, 2 weeks

2. Local Support

\$ NONE

3. Overseas Training

\$145,650

** PhD in USA

\$ NONE

** PhD in TWC

\$ 5,000

- * One on-going in Philippines at UPLB. (May 1983-August 1987). Person-months in 1984-1985 12.0.

** MS in USA

\$ 22,400

- * One on-going at Colorado State University in soil-irrigation area. (August 1983-February 1986). Person-months in 1984-1985 12.0.

\$11,900

- * One on-going at Fresno State September 1984-June 1986. Person-months in 1984-1985 9.0.

\$10,500

- * One person to study minimum tillage techniques (doing research in Bangladesh if possible), possibly at

University of Kentucky, or University of Florida. Person should be from BARI. Needed to carry on intensive research using minimum tillage techniques with crops researched by BARI. Starting date expected September 1985-March 1988 as soon as possible. Person-months 1984-85 0.0.

** MS in TNC

\$ NONE

* One person to study soil microbiology. Person should be from DU, BARI, BRRI, BAU or INA. Further details will be available with consultants (Dr. Beck) report in September 1984. Expected dates June 1985-December 1987. Person-months in 1984-1985 0.0.

\$ None

** Up to 6 months USA.

\$53,500

* Two persons for six months each to receive intensive upgrading at two US universities. Work could count towards local degree requirements. One person to be trained in maximum yield concepts including research techniques, statistics, agronomy and economic interpretations. Possibly at University of Florida, or University of Illinois. The other person should receive training in minimum tillage practices, water management, and soil conservation. Possibly at University of Kentucky, or North Carolina State University, plus on-job SCS training.

Both candidates should be located in the US for spring semester. Person-months in 1984-1985 (2 x 6) = 12.0.

\$24,500

- * One two months training - observation tour for 4 persons in US to study soil fertility aspects; mainly, service laboratory operation analytical procedures, and maintenance, systems used for sample handling and recommendation preparation, research - laboratory - extension linkages, and technology transfer systems. Possible visits to University of Georgia, ASI, PPI, University of Florida, North Carolina State University and Cornell University. Should be initiated as early as possible. Person-months $4 \times 2.0 = 8.0$. \$29,000
- ** Up to 6 months TWC \$121,000
- * One three month training - observation tour for four people in minimum tillage research in USA, ITTA and ICRISAT. Should be initiated in November-December 1984. Person-months $4 \times 3.0 = 12.0$. \$37,000
- * One two-month course on problem soil management for 10 people at AIT (Bangkok). Course should start in October 1984. Person-months $10 \times 2.0 = 20.0$. \$60,000
- * Two persons, three months at ENF resource center, Bangkok for internship to strengthen local capabilities, starting December 1984. Person-months $2 \times 3.0 = 6.0$. \$11,000
- * One 1 month course on instrumentation functions, utilization, maintenance and repair for 5 people at AIT (Bangkok). Dates not set. Person-months $5 \times 1.0 = 5.0$. Funded under Equipment Maintenance. \$ NONE

- * Each year training opportunities arise that could not be foreseen at planning time. Funds for 4 such events are needed. One such example is an ISNAT workshop to be held in December in Venezuela. Such a trip should anticipate additional stops at old benchmark soil research sites, and at one or two US universities involved in the program. \$10,000
- * 1983-1984 committed costs for three participants training in Bangkok to be recorded in 1984-1985. \$ 3,000
- ** International Conferences \$ 24,750
 - * Plans for 10 persons to attend international conferences in the soils area.
- ** Staff Travel \$ 19,000
 - * Plans for 4 persons for five weeks to travel to various functions; such as regional network meetings, new concept seminars, and to participate as committee members for institutes/organizations.
- 4. In-Country Training: \$ 53,850
 - ** Short-Term Courses \$ 18,000
 - * One 3-week laboratory technicians training course at BARI, November 1984. 16 laboratory specialist participants from various institutes. \$ 3,000
 - * One 1-week course on biological nitrogen fixation for 40 research/extension personnel from various institutes, February-March 1985, BAU. \$ 5,000

- * One 3-week course on fertilizer research for 36 soil fertility field research personnel from various institutes. October 1985, BJRI/BARI/BARC. \$ 8,000
- * Two 1-week courses on instrumentation for 16 (each course) laboratory heads from various institutes. March 1985, BARI. \$ 2,000
- ** Workshop/Seminar \$ 33,400
 - * One 2-3 day workshop on data report writing, and paper presentation at seminars for 100 soil scientists from various institutes. January 1985, BARC. \$ 4,000
 - * Six 1-day workshops on plant and soil sampling techniques for 250 total research/extension personnel. October 1984-April 1985, BARI sub-stations and other institutes. \$ 2,100
 - * Four 2-day workshops on use of fertilizer recommendation guide for total of 100 research/extension personnel. November 1984-June 1985, BARI sub-stations or other convenient institutes. \$ 1,800
 - * One 1-week workshop on general soil fertility in Bangladesh for 60 research/extension personnel from various institutes. January-February 1985, BARC. \$ 5,500
 - * About 20 seminars given by visiting consultants at various institutes to a total audience of about 500-600 persons. \$ NONE
 - * A one-week international workshop on minimum tillage is in the planning stages. No dates can be fixed at this time. \$20,000

** Sabbatical Studies \$ 1,150

* One on-going in Soil Fertility and Microbiology. \$ 575

* Possibility of one person for 6-9 months to work at the BARI model laboratory on analytical procedures. \$ 575

** Scholarships \$ 1,100

* One on-going MSc at BAU studying Soil Microbiology (June 1983-December 1984). Person-months in 1984-1985 6.0. \$ 240

* One on-going MSc at BAU studying Soil Physics (May 1983-November 1985) 6.0. \$ 240

* Two possible candidates to study at DU or BAU one in the area of soil fertility at PhD level and the other at MS or PhD level in the area of soil and water management. Both should initiate work from January 1985 to 1988 and 1989 respectively. Person-months in 1984-1985 $2 \times 6.0 = 12.0$. \$ 660

5. Contract Research \$ 12,000

** Ongoing Projects \$ NONE

* Soil Test Crop Response correlation Studies: Involving DU, BAU, BINA, STRI, BJRI, and BARI. purpose is to develop data from which to make accurate fertilizer recommendations based on soil and plant analyses. Expected to be funded by donor other than USAID.

- * Management of Problem Soils: involving BAU, BARI, DU, and BINA. Purpose is to obtain information relevant to management of problems soils such as saline soils, acid sulphate soils, Hill Tract soils, and low O.M. soils. Funded under water management.
- * Micronutrient Research involving BARI, BINA, and BAU. Purpose is to emphasize specific problems associated with micronutrients and to develop a booklet on visual symptoms. Funded under water management.
- * Deep Point N. Placement: involves BINA, BRRI, BARI, and BADC. Purpose is to study the possibilities and conditions of increasing N efficiency in rice. Funded by IFDC.
- * Phosphorus Sources Studies: involving BINA, BRRI, BARI, and BADC. Purpose is to study the possibilities of using alternate and cheaper sources of phosphorus than the traditional TSP. Funded by IFDC.
- * Potassium Studies: Involving BAU, BINA, BARI and BRRI. Purpose is to determine on what soils, and how much potassium is needed and to learn more of the potassium dynamics of Bangladesh soils. Funded by CIDA.
- * Sulphur and Zinc Research: involving BRRI, BARI, BINA and BAU. This project is in final stages prior to termination. Purpose was to identify areas needing S and Zn and to determine which analytical methods predicted needs best. Funded by FAO.

- * Biological Nitrogen Fixation Studies: involving BINA, BAU, BRRI and BARI with casual participation by DU. Purpose is to obtain information and develop strains of bacteria that will reduce farmers dependence on chemical N fertilizer. Funded by IDA.

** New Projects

\$ 12,000

- * Soil sampling research with the objectives of determining depth and frequency of sampling and variation in fertility from site to site expected budget \$17,500. Two year duration project proposal is developed. Expected commencement January 1985.

\$ 8,000

- * Sulphur studies research with the objective of intensifying efforts on what appears to be a major nutrient deficiency in Bangladesh. Expected to be funded by CIDA.
- * Fertilizer management practices in Bangladesh cropping systems. This will look at long range fertilizer use in relation to cropping patterns, and the soil environment. The maximum yield concept will be incorporated into these trials. The objectives will be to determine how much, and to what crops fertilizers should be applied in a cropping pattern, and to identify biological yield constraints. Expected to be funded other than USAID.

* A minimum tillage research proposal with the objectives of increasing crop diversification, cropping intensity, and yields of rabi crops will be prepared. Expected budget \$ 8,000. Two year project duration. Expected implementation date January 1985.

\$ 4,000

* A proposal for studying nitrogen efficiency using both the Fitts concept of "Keying on Nitrogen" and efficiency evaluation techniques will be prepared. Not expected to be implemented in 1984-1985.

\$ -0-

6. Commodities

\$69,330

** Commodities

* Only items not ordered by the soil program prior to July 1, 1984 are considered in this section and cost figure.

\$69,330

2* The basic commodity needs of the BSFEI program have been met through USAID Phase II project commodities previously purchased or ordered and by those donated by CIDA. However, several specialty needs are required by different institutes for overall project success. These will include soil and plant sampling equipment, audio-visual equipment for outreach, possibly a sulphur analyzer, and several supply or replacement items for instruments. The soils program will work with the institutes in the acquisition of these materials. Expected cost \$18,000 procurement of these items will not be made unless a transfer of funds for another budget line item is made.

7. Construction

* NONE

- * Minor construction/renovation is necessary at several institutes mainly with greenhouse repair or shelving or drying cabinets for samples. Design suggestions and financing assistance will come from the the soils program. Estimated cost \$ 3,000.00

- * On-going construction at BARI. Cost \$ 2,000.00

Note: All construction is funded under Farm Development Division of Technical Support.

8. Observations:

- * Prospects for completion of this work plan are excellent at this writing. The only possible breakdown might be in overseas training. In order for the program to reduce its dependence on international technical assistance, for the completion of this work plan, and the ultimate success of the program, the importance of overseas training cannot be over emphasized.

TOTAL

\$529,455
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WATER MANAGEMENT RESEARCH

INTRODUCTION

The Water Management Research program area budget as amended, represents roughly a quarter of the project. This emphasis on irrigation reflects concern that research effectively supports the current rapid pace of irrigation development. Irrigated land, currently expanding at the rate of roughly 7-8% per year, will increase to nearly 50% of the arable area by 1990. With most of the increase in irrigated acreage in the minor irrigation sector, research in this program area is designed to assist farmers in the minor irrigation sector and to provide information for government policy makers to use in developing policies to support equitable distribution of benefits, efficient use of resources, and rapid expansion of irrigated acreage.

Progress in 1983-84 in the WMR program area was substantial and encouraging. Two national workshops defined priorities for research and focused attention on research activities with distribution systems for minor irrigation. The 1984-85 work plan provides for development of activities in a number of topical areas based on priorities agreed to in 1983-84.

Activities in the WMR program area are carried on under the supervision of the Member-Director for Soil and Irrigation, Agricultural Engineering, Economics and Social Sciences, and Crops. Project support for activities in the WMR program area is accordingly divided into project support through each of these four divisions.

PLANNED ACTIVITIES

The activities planned for 1984-85 fall into 9 areas: i) issues related to utilization of groundwater, ii) pumps and motors to lift ground and surface water, iii) improved water distribution systems, iv) promotion of irrigation for crops other than rice in the dry season, v) irrigation on problem soils, vi) economic impact of the irrigation, vii) research and extension linkages, viii) development of personnel and institutional capacities, and ix) evaluation of research in water management.

1. Groundwater Research

The water management program area will begin to look into groundwater issues in 1984-85. In the past year or two, it has become increasingly evident that the government badly

needs good information on groundwater availability and recharge for informed national policies to guide development of the minor irrigation sector. In 1984/85 come, DRI will support contract research on groundwater and will hire consultants for special studies as first steps into this crucial area.

A local consultant will work on groundwater related issues with emphasis on assessment, monitoring, and management of groundwater resources. An expatriate consultant will review and evaluate well technology.

A four-week course on "Groundwater," for 20-25 agricultural, irrigation, and civil engineers will be taught by a team of expatriates.

Several contract research projects have been developed in this area and will be promoted. Efforts will be taken to link this research with on-going groundwater research by the Groundwater Circle, BWDB and by the Master Plan Organization.

2. Pumps and Motors

Irrigation equipment--pumps and motors to lift ground and surface water--is basic to all irrigation in the modern minor irrigation sector. There are currently about 200,000 motorized pumps and 500,000 manual pumps in this sector. The program area will promote research to study pump performance in the field and to examine options to improve the efficiency of irrigation equipment. Training in pumps will strengthen research skills.

Consultants will be used to assist in several areas. A manual pump inventory in Bangladesh is proposed to be undertaken by a local consultant and a consultant will look at availability and distribution of spare parts for irrigation equipment. A consultant will review standard pump discharge and design decisions for Bangladesh to see if there is anything to be gained by introducing pumps with alternate discharge or design characteristics.

A tour to Burma or Pakistan will be arranged for four persons to study LLP and tubewell irrigation systems.

Three short-courses are planned to support this activity. A three week course on "Improvement of Indigenous Low-Cost Irrigation Appliances" for 25-30 participants from the research system will be taught largely by staff from local NGO's with MOSTI experience. A four-week course on "Pump and Motor Technology" for 20-25 agricultural, irrigation, and

mechanical engineers is to be taught by a team of expatriate specialists. A 5-day course on pump irrigation systems in Bangladesh will be repeated at intervals throughout the year (offered 4 times with 20-30 participants each time) and will be presented at several institutions throughout the country.

A sabbatical will be arranged to study the technical performance of shallow tubewells in the Comilla area.

Contract research will be continued and new projects initiated. A project on manual irrigation is continuing. A project for a survey of power pump performance in the field will be initiated.

3. Improved Water Distribution Systems

Improved water distribution systems are a major component of command area development programs. A large increase in research and evaluation activities is planned in this important field.

Consultants will be used to: 1) design an irrigation and drainage system for the BARI research substation at Debiganj, Dinajpur 2) assist in designing research on distribution systems for minor irrigation 3) assist in the design of contract research proposals to examine the possible usefulness of drip and sprinkler irrigation for Bangladesh and 4) study water measuring devices for use in minor irrigation systems, specifically the need is to develop reliable devices to measure discharge from wells.

The Diagnostic Analysis team trained initially in 1983 through a joint BARC-CSU activity will evaluate a large-scale irrigation system in the country in early 1985.

A tour to India for 3-5 participants will be arranged to study the design, construction, operation, and maintenance of minor irrigation systems.

A multidisciplinary team will be organized to tour Sri Lanka to study the organization and technology for efficient distribution of water in large-scale distribution systems.

A workshop in "Improved Distribution Systems for Minor Irrigation" will be arranged to review past, current, and scheduled research and pilot project activities with distribution systems.

A two-day workshop on "Methodologies to Evaluate the Performance of Irrigation Systems" will be arranged.

Contract research projects dealing with improved distribution systems are being promoted and will be reviewed and funded.

4. Irrigation of Crops (other than rice) in the Dry Season

BARC will launch a program of research, consultant investigations, and discussions to promote irrigation for crops other than rice in the dry season. Unless cropping rotations for irrigated agriculture are developed with dry season irrigated crops like wheat or potatoes in place of irrigated boro rice, irrigated acreage in many districts of Bangladesh will be constrained by the limits of ground and surface water available.

Consultants will be engaged to advise on irrigation methods for dry-field irrigated crops, to study the potential for fodder crops under irrigated and non-irrigated conditions, and to study the feasibility of increasing wheat acreage and production through reallocating water currently being used for boro rice cultivation.

A two-day workshop on "Promotion of Dry-Field Irrigated Crops" will be arranged.

Contract research proposals on diversified low-water using irrigated crops will be generated, reviewed, and approved for funding.

5. Irrigation on Problem Soils

The WIR program area will support research on irrigation agronomy, particularly dealing with irrigation on problem soils and irrigation in saline water and soils areas of Bangladesh.

A consultant will be engaged to review and assess status of saline soil and water research in Bangladesh.

Two sabbaticals will be supported on soil irrigation parameters and on yield productivity in relation to water management efficiency in the Jamalpur area.

Contract research will continue on irrigation with problem soils and on irrigation in saline coastal areas of Bangladesh.

6. Economic Impact of Irrigation

Irrigation development in the context of Bangladesh involves the government in decisions about what technologies to support, how to make the equipment available to the farmer, and how to encourage most efficient use of the equipment. To make good decisions, government needs good information about the economic impact of the irrigation program. In 1984-85, BARC with Project support will not only provide for an increase in research on irrigation economic issues but will also take steps to assemble and to improve access to information from many previous studies.

Consultants will be used to: 1) study the distribution of benefits from irrigation, 2) assist in the development of studies on the economics of STW irrigation, 3) assist in developing a policy-oriented model of the irrigation sector, and 4) continue a study on the economics of DTW irrigation (one local and one foreign consultant), and 6) study a topic in economics of irrigation to be specified later.

Several courses will be arranged. A two week course on "Economics of Irrigation" will be presented at BARC, Comilla, and a four-week course on "Water Production Function" will be taught by a team of consultants.

A two-day workshop on electrification of irrigation equipment will be held.

A number of contract research projects will be reviewed for funding.

7. Research and Extension Linkages

Research linkages with the Department of Agricultural Extension and with the national program for command area development, Irrigation Management Program (IMP), will be strengthened during 1984-85.

BARC will sponsor a course on "On-Farm Water Management" for 20-25 instructors from the 11 Agricultural Training Institutes (ATI) around the country; the course will be taught by a team of consultants.

BARC will continue to work with the Rural Development Academy (RDA) and with the national IMP program through contract research support for work on improved distribution systems at RDA and through on-going contract research on tubewell command areas within the IMP program.

BARC may develop other links with extension through reviewing the ATI curriculum for water management, through assistance in developing textbooks and manuals in irrigation and water management for extension agents, and through assistance in arranging training for prospective Subject Matter Specialists in irrigation water management.

8. Development of Personnel and Institutional Capacities

IADS will support BARC and participating institutes in the development of personnel and institutional capacities to pursue effective programs of research on the many issues related to irrigation and water management. Relative to the importance of irrigation in the agriculture of Bangladesh, the subject of irrigation in BARC and in participating research institutes has to date been a small and insufficient portion of research plans and programs. Programs need to be developed, equipment must be bought, and personnel must be trained.

To strengthen the capacity of BARC to deal with an enlarged program of activities in the WMR program area, 21 months of local consultant services will be arranged throughout the year to assist the various divisions in preparing special studies to be identified, as counterparts for expatriate consultants, and in other activities as latter identified consultant services are allocated as follows: 6 months for Soils and Irrigation; 6 months for Economics and Social Sciences; 6 months for Agricultural Engineering; and three months for Crops and Forestry).

A team of consultants will be engaged to develop an annotated bibliography on IWM in Bangladesh, to collect materials in the bibliography for HALDOC and for other libraries in the agricultural research system, and to develop a computerized filing system for IWM materials in the HALDOC library.

A consultant will be engaged to study the value and use of remote sensing in agricultural research in Bangladesh with particular attention to uses in the area of IWM. A team of consultants will then give a four-week course on "Techniques for Use of Remote Sensing in Agricultural Research" for BSc and MSc level personnel in the agricultural research system, and a two-day course on "Use of Remote Sensing in Agricultural Research" for senior level administrators in the research system and for Ministry of Agriculture (MOA) personnel.

Persons will be selected and posted for degree training in IWM in the US, third world countries, and Bangladesh. Four persons will be selected for PhD training: two will study in

the US (one in irrigation engineering and one in water law), and two will study in third world countries (irrigation water management and irrigation engineering). Six persons will be selected for MSc training: four will study in the US (pumps and motors, groundwater hydrology, water management extension, and water resource economics), and four will study in Bangladesh.

Ten Masters degrees in third world countries are in process at UPLB, AIT and CLSU.

Short-term foreign training in IWM will be arranged: eight persons will be selected and sent for short-term training in the US in irrigation-related courses to be identified, ten trainees will be selected and sent to the Indian Agricultural Research Institute for a course on Irrigation to be developed especially for this group; and six other short-term training experiences in TWCs will be arranged throughout the course of the year.

Three persons will be selected and sent to international conferences on irrigation-related topics.

A monthly seminar will be established at BARC in collaboration with Master Planning Organization (MPO) on irrigation related issues.

Commodities will be ordered to strengthen the Irrigation Engineering Section at BARI. This is a new section of the Agricultural Engineering Division and is essential to the development of an effective capacity for research in IWM issues at BARI. Commodities will also be bought as necessary to strengthen other institutes involved in contract research programs in the WMR program area.

9. Evaluation of Research in Water Management

BARC with IADS support will arrange several evaluations during the year to review project-related activities in the WMR program area.

An external evaluation by an international team with two expatriate consultants and two local consultants will be arranged for July 1984.

An internal evaluation by a team of local consultants will be arranged for June 1985.

WATER MANAGEMENT:

PROJECT SUPPORT THROUGH SOILS AND IRRIGATION DIVISION

I. Specialists and Consultants

\$ 196,275

** Specialists

- * Water Management Extension Specialist (12 months)
- * Water Management Specialist (12 months)

** Consultants

- * July 1984. Two consultants for 3 weeks each to evaluate irrigation water management program. Person-months: 1.5
- * September 1984. Consultant for 2 weeks to design Debigonj irrigation system. Person-months: 0.5
- * February 1985. Consultant for 4 weeks to assist with research on distribution systems for DTWs, STWs, and LLPs. Person-months: 1.0
- * March-April 1985. Consultant for 6 weeks to advise on irrigation methods for upland crops. Person-months: 1.5
- * March-April 1985. Dr. G.R. Sandhu to be a consultant for 6 weeks to review and assess status of saline soil and water research in Bangladesh. Person-months: 1.5
- * April 1985. Consultant for 4 weeks to evaluate the possible value of remote sensing for agricultural research in Bangladesh. Person-months: 1.0

II. Local Support

\$ 13,000

** Consultants

\$8,000

- * August 1984-April 1985.
Local consultant for 36 weeks

to study the potential of
fodder crops in the country
under irrigated and non-
irrigated conditions. Person-
months: 2.0

\$ 5,000

* Local consultants to be
identified and recruited
as needed for a total of six
months to assist the Soils
and Irrigation Division in
the management of activities
(e.g., local workshops), as
counterparts to expatriate
consultants, and with special
studies to be identified.
Person-months: 6.0

\$ 3,000

** Internal Monitoring & Evaluation

\$ 5,000

* July 1984. Team of two
consultants to serve for
three weeks to conduct an
external evaluation of the
IWM program. Person-months: 1.5 \$3,000

* April 1985. Team of three
local consultants to serve
for 4 weeks to conduct an
internal evaluation of the
IWM program activities
during fiscal year 1984-85.
Person months: 3.0

\$2,000

III. Overseas Training

\$ 98,750

** PhD Study in USA -

\$12,500

* One on-going PhD at Colorado
State (Aug/83- Aug/87).

Person-months in 1984-85: 12.0 *12,500

* One trainee to pursue
graduate work in irrigation
engineering. Expected dates:
Sep/85-Sep/89. Person-months:
0.0

0

** PhD Study in TWC

-0-

** MSc Study in USA

-0-

- * One person to pursue work in water management extension.
Expected dates: Sep/85-Mar/88
Person-months in 1984-85: 0.0
- ** MSc in TWC \$49,300
- * Three on-going MSc at AIT, Thailand (Jan/84-Jul/86).
Person-months in 1984-85: 36.0 \$14,000
- * Two on-going MSc at UPLB Philippines (Nov/83-May/86).
Person-months in 1984-85: 24.0 \$10,400
- * Two on-going MSc at UPLB (Jun/84-Dec/86). Person months in 1984-85: 24.0 \$ 9,400
- * Three on-going MSc at CLSU (Jun/84-Dec/86). Person months in 1984-85: 36.0 \$15,500
- ** Up to Six Months in USA \$15,750
- * Three participants in short-term courses such as "Soils and Water Conservation and Management" at USU. Courses to be identified.
- ** Up to Six Months in TWC \$ 5,000
- * Two participants in courses such as "On-farm Water Management" at AIT. Courses to be identified. \$ 5,000
- * June 1985. Ten trainees for 8 weeks to participate in course on "Irrigation Water Management" to be held at the Indian Agricultural Research Institute in New Delhi, India. Estimated earmarked funds of \$38,500 are expected to be expended in 1985-86. Budget in 1984-85: 0.0 -0-
- ** International Conferences \$11,000

- * Three participants for 2 weeks
Dr. L.R.Khan will attend a
conference on "Hydraulic
Resources" in Thailand (Sep-
tember 1984); two other
persons to be identified
to attend conferences to be
designated

** Staff Travel \$ 5,200

- * March or April 1985. Three
to five participants for
2 weeks to India to observe
and study minor irrigation
systems.

IV. In-Country Training \$109,815

** Short-Term Training \$104,300

- * January 1985. Four-week USDA
course "On-farm Water Manage-
ment" for 20-25 Agricultural
Training Institute personnel.
To be taught by a team of
three expatriates. \$35,000

- * February 1985. Three-weeks
analysis of farm irrigation
systems by BARC/BARI/BAU
Diagnostic Analysis team
with 20-25 participants. \$ 3,000

- * June 1985. Four week course
on "Techniques for Use of
Remote Sensing in Agricul-
tural Research" for 20-25 BSc
and MSc personnel in the
agricultural research system. \$40,000

- * Cooperative programs with
Department of Agricultural
Extension to include, as
appropriate, assistance in
developing a textbook in IWM
for the ATI's; review of ATI's
IWM curriculum; development of
an experimental intensive
farmer level training prog-
ram in a selected upazila;
preparing and funding course

for the ten soon-to-be-appointed subject matter specialists in IWM.

\$26,500

** Discussions/Seminars

\$ 4,500

- * July 8-9, 1984. Workshop on "Improved Distribution Systems for Minor Irrigation." 75-100 participants.

\$ 1,500

- * June 1985. Two-days workshop on "Methodologies to Evaluate the Performance of Irrigation Systems." 75-100 participants expected.

\$ 1,500

- * October 1984-June 1985. Monthly seminar at BARC on irrigation water management issues. Participation of agricultural scientific community. 20-40 participants expected monthly.

\$ 1,500

** Sabbaticals

\$ 575

- * Study of soil irrigation parameters in Jamalpur area (Jan/85-Dec/85). Person-months in 1984-85 : 6.0

** Scholarships

\$ 240

- * One trainee to pursue MSc degree in Bangladesh in irrigation water management at BAU or BUET. Person months in 1984-85 : 6.0

V. Contract Research

\$132,200

** Four on-going Projects

\$122,200

- * Micronutrients Studies Under Both Irrigated and non-irrigated Conditions (SI-02-WM). (Sep/82-Aug/85).

\$22,200

- * Management of Problem Soils (SI-03-WM). (Oct/82-Sep/85)

\$40,000

- * Saline Water and Crop Production (SI-04-WM). (Oct/83-Sep/85).

\$15,000

* Command Area Development
(SI-05-WM) (Oct/83-Sep/85). \$25,000

** One or two new projects to be
approved and funded; one
proposal has been received
on the following topic. \$10,000

* National survey on the perfor-
mance of different types of
irrigation equipment in
Bangladesh. \$10,000

VI. Commodities

\$158,000

* Commodities for institutions
as needed for the initiation
of new contract research
projects. \$ 5,000

* Commodities ordered for
institutional development
during 1983-84 expected to be
purchased during 1984-85.
For all division. \$153,000

TOTAL: \$708,040
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WATER MANAGEMENT:

PROJECT SUPPORT THROUGH AGRICULTURAL ENGINEERING DIVISION

I. Specialist and Consultants

\$121,225

** Specialists

- * Agricultural Engineer (12 months)

** Consultants

- * January-February 1985. Consultant for 8 weeks to review, evaluate, and advise on well technology. Person-months: 2.0
- * January-February 1985. Consultant for 4 weeks to develop a research work plan to study water measuring devices. Person-months: 1.0
- * February 1985. Consultant for 6 weeks to look at availability and distribution of spare parts for irrigation equipment. Person-months: 1.5
- * May 1985. Consultant for 4 weeks to study the impact of diversification--in terms of rated discharge capacities--of minor irrigation equipment in Bangladesh. Person-months: 1.0

II. Local Support

\$ 12,000

** Consultants

- * October 1984-June 1985. Local consultant for 24 weeks to work on ground water-related issues with emphasis on survey and monitoring activities and to serve as liaison between BARC and other institutions involved in ground water studies. Person months: 6.0 \$ 4,000
- * December 1984-March 1985. Local consultant for 17 weeks to conduct a manual pump inventory of the country. Person-months: 4.0 \$ 5,000

- * Local consultants to be identified and recruited as needed for a total of six months to assist the Agricultural Engineering Division in the management of activities, as counterparts for expatriate consultants, and with special studies to be identified. Person-months: 6.0

\$ 3,000

III. Overseas Training

\$ 30,500

** PhD Study in TWC

- * one person to pursue graduate work in agricultural (water component) engineering. Expected dates: Sep/85-Sep/89. Person-months in 1984-85: 0.0

** MSc Study in USA

-0-

- * one person to pursue work in groundwater hydrology. Expected dates: Sep/85-Mar/88. Person-months in 1984-85: 0.0

** MSc Study in TWC

-0-

- * one person to pursue work in pumps and motors. Expected dates: Sep/85-Mar/88. Person-months in 1984-85: 0.0

** Up to Six Months in USA

\$15,000

- * Three participants in short-term courses such as "Well, Pumps, and Pumping for Irrigation" at USU. courses to be identified.

** Up to Six Months in TWC

\$10,700

- * Two participants in courses such as "Water Management" at IRRI. Courses to be identified. \$10,000

- * 1983-84 Training participants costs expected to be recorded in 1984-85.

\$ 700

** Staff Travel		\$ 4,800
* December 1984. Four participants for 2 weeks, one each from BAU, BRRI, BARI, and BUET to Burma or Pakistan to observe and study LLP and tubewell irrigation systems.		
IV. In-Country Training		\$ 75,815
** Short-Term Training		\$ 75,000
* October 1984-June 1985. Five-day course to be repeated four times "Pump Irrigation in Bangladesh"; multi-disciplinary attendance intended; twenty participants per session. Venue: to be rotated among agricultural institutes in the country.		\$ 12,000
* April 1985. Four-weeks course on "Pumps and Motors Technology" for twenty to twenty-five agricultural, irrigation, and/or mechanical engineers at BSc and MSc levels. To be taught by team of three expatriates.		\$ 35,000
* May 1985. Four-week course on "Groundwater" for 20-25 agricultural/irrigation/civil engineers. To be taught by team of expatriates.		\$ 28,000
** Sabbaticals		\$ 575
* In-depth study of technical performance of shallow tube-wells in Comilla area (Jan/85-Dec/85). Person-months in 1984-85: 6.0		
** Scholarships		\$ 240
* One trainee to pursue MSc degree in Bangladesh at BAU or BUET in agricultural engineering (pumps). Person-months in 1984-85: 6.0		

V. Contract Research

\$ 20,000

- ** Three to five new projects to be approved and funded; contract research proposals have been solicited on the following topics

\$20,000

- * Effect of intensive well installation on groundwater recharge and safe yield.
- * Performance of different types of manual pumps in farmers' fields.
- * Performance of different draft animals under different loads and climatic conditions.
- * Cost and efficiencies of manual, animal-driven, and power pumps.
- * Mechanization strategies in pumps and tubewell irrigation systems in the socio-economic context of Bangladesh.
- * Improvement of tubewell irrigation systems through the use of reservoirs.
- * Human energy expenditures and ergonomics of manual pumps.
- * Effective pump irrigation systems for Bangladesh as referred to command area development.

VI. Commodities

\$ 70,000

- * Local and imported commodities to develop the irrigation engineering section at BARI. Needs to be determined will include pumps and motors, pipes for distribution system studies, etc.

\$50,000

* Commodities for institutions,
as needed for the initiation
of new contract research
projects.

\$20,000

TOTAL: \$329,540

WATER MANAGEMENT:

PROJECT SUPPORT THROUGH ECONOMICS AND SOCIAL SCIENCES DIVISION

I. specialists and Consultants

\$ 55,800

** Consultants

- * July-August 1984. Dr. Jan Emmert. To study the impact of irrigation on distribution of benefits. Person-months: 2.0
- * December 1984 to January 1985. Consultant for 6 weeks to develop a study on economics of shallow tubewells. Person-months: 1.5
- * December 1984. Consultant for 4 weeks to develop a computerized file on library holdings in IHM. Person-months: 1.0
- * January 1985 and June 1985. Consultant for two periods of 4 weeks each to develop a policy-oriented model of the irrigation sector. Person-months: 2.0
- * February-March 1985. Dr. Sam Johnson III for 6 weeks to continue a study on the economics of deep tubewell irrigation. Person-months: 1.5
- * Not yet scheduled. Dr. James Roumasset to study an issue on the economics of irrigation for four weeks. Person-months: 1.0

II. Local Support

\$ 10,000

** Consultants

\$10,000

- * July 1984-November 1984. Dr. Siddiqui to continue a study on the economics of deep tubewell irrigation. Person-months: 5.0 \$ 1,000
- * July 1984-December 1985. Team of local consultants (with Dr. Mosharruf Hussain as a

team leader) to prepare an annotated bibliography on materials related to IWM and to collect and purchase materials for NALDOC on IWM. Person-months: 18.0 \$6,000

* Local consultant to be identified and recruited as needed for a total of nine months to assist the Economics and Social Sciences Division in the management of activities, as counterparts for expatriate consultants, and with special studies to be identified. Person-months: 9.0 \$3,000

III. Overseas Training \$ 22,000

** PhD Study in USA -0-

* One trainee to pursue graduate work in water law. Expected dates Sep/85-Sep/89. Person-months in 1984-85: 0.0 -0-

** MSc in TWC -0-

* One trainee to pursue work in water resources economics. Expected dates are Sep/85-Mar/88. Person-months in 1984-85: 0.0 -0-

** Up to Six Months in USA \$11,000

* Two participants in courses such as "Water Production Function" at USU. Courses to be identified. \$11,000

** Up to Six months in TWC \$ 5,000

* Two participants in irrigation courses yet to be specified. \$ 5,000

** Staff Travel \$ 6,000

* January or February 1985. Six participants for two weeks in a multidisciplinary team to Sri Lanka to

study the organization and technology for efficient distribution of water in large-scale distribution systems.

\$6,000

IV. In-Country Training

\$ 44,480

** Short-term Courses

\$42,500

- * June 1985. Two day course on "Use of Remote Sensing in Agricultural Research" for 30-35 senior research and Ministry of Agriculture administrators.

\$5,000

- * Date to be determined. A 4-week course on the "Water Production Function" to be taught in 1985 by a team of consultants from USU. 20-25 participants expected.

\$35,000

- * Date to be determined. A 2 week course on "Economics of Irrigation" to be held at BARD Comilla. 20-25 participants expected.

\$2,500

** Discussions/Seminars

\$1,500

- * April 1985. Two-day workshop on "Electrification of Irrigation Equipment." 75-100 participants expected.

\$1,500

** Scholarships

480

- * Two trainees to pursue MSc degrees in the economics of irrigation at local universities. Person-months in 1984-85: (2x6=) 12.0

V. Contract Research

\$ 43,000

** Two on-going projects.

\$23,000

- * Land Use in Irrigated Areas

(ESS-04-WR). (Jul/83-June/85). \$15,000

* Economic Viability of DTW
irrigation in Joydebpur
(ESS-05-WM) (Jul/84-Jun/85). \$8,000

** Three to five new projects
to be approved and funded;
contract research proposals
have been solicited on the
following topics. \$20,000

* Mobility of irrigation
equipment.

* Distribution of benefits
from irrigation according
according to ownership and
management of equipment.

* History of organization for
minor irrigation in Comilla
district.

* Economics of STW irrigation.

* Response to STW's running dry.

* Economics of supplementary
irrigation for kharif and rabi
crops.

VI. Commodities \$ 30,000

* Library materials in associa-
tion with annotated bibliog-
raphy on irrigation and water
management (materials on all
subjects, not just the social
sciences). \$10,000

* Commodities for institutions,
as needed for the initiation
of new contract research
projects. \$20,000

TOTAL: \$205,280

WATER MANAGEMENT:

PROJECT SUPPORT THROUGH THE CROPS DIVISION

I. Specialists and Consultants

\$ 6,825

** Consultants

- * May 1985. Consultant for 4-weeks to assist in the design of contract research proposals in drip and sprinkler irrigation if these methods are found cost-effective for Bangladesh. Person-months: 1.0

II. Local Support

\$ 2,500

** Consultants

- * November-December 1984. Local consultant for 8 weeks to study the feasibility of increasing wheat acreage and production by diverting water currently irrigating boro rice. Person-months: 2.0 \$1,000
- * Local consultants to be identified and recruited as needed for a total of three months to assist the Crops and Forestry Division in the management of activities, as counterparts for expatriate consultants, and with special studies to be identified. Person-months: 3.0 \$1,500

III. In-Country Training

\$ 5,075

** Short-Term Courses

\$3,000

- * April 1985. Three-weeks course on "Improvement of Indigenous Low-Cost Irrigation Appliances": 25-30 participants. To be taught by team that may include staff of local NGO's.

** Discussions/Seminars

\$1,500

- * February 1985. Two-day workshop on "Promotion of Dry-Field Irrigated Crops." Seventy to 100 participants expected.

** Sabbaticals \$ 575

- * Study yield productivity in relation to water management efficiency in Jamalpur area (Jan/85-Dec/85). Person-months in 1984-85: 6.0

IV. Contract Research \$ 33,500

** Two on-going projects. \$13,500

- * Cropping Systems Defined Area Jamalpur (CF-03-2M), (Jul/83-Jun/86). \$8,000

- * Efficiency of Bamboo Tube-wells (CF-04-WM). (Jul/83-June/85). \$5,500

** Two to four new projects to be approved and funded; contract research proposals have been solicited on the following topics. \$20,000

- * Maximizing fruit yield through water management and cultural practices.
- * Maximizing vegetable production through irrigation and water management.
- * Use of irrigation water for increasing vegetable seed production.
- * Use of low-lift pumps for maximum utilization of land around various water bodies like beel, jheel, and haor.
- * Low-water use cropping systems for irrigated agriculture.

V. Commodities

\$ 5,000

* Commodities for institutions,
as needed for the initiation
of new contract research
projects.

TOTAL : \$ 52,900

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GRAND TOTAL - ALL DIVISIONS : \$1,295,700

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AGRICULTURAL RESEARCH PROJECT PHASE II
ANNUAL FINANCIAL PLAN 1 JULY 1984 - 30 JUNE 1985
IRRIGATION WATER MANAGEMENT PROGRAM AREA

BUDGET CATEGORIES	SOILS AND IRRIGATION	AGR. ENG.	ECON. AND SOC. SCI.	CROPS	TOTAL
1. SPECIALIST & CONSULTS	196275	121225	55800	6325	380125
2. LOCAL SUPPORT					
Local Consultants	8000	12000	10000	2500	32500
Internal Evaluation	5000	0	0	0	5000
SUB-TOTAL	13000	12000	10000	2500	37500
3. OVERSEAS TRAINING					
PhD in USA	12500	0	0	0	12500
PhD in TWC	0	0	0	0	0
M.S. in USA	0	0	0	0	0
M.S. in TWC	49300	0	0	0	49300
Up to 6 mos. USA	15750	15000	11000	0	41750
Up to 6 mos. TWC	5000	10700	5000	0	20700
International Conf.	11000	0	0	0	11000
Staff Travel	5200	4800	6000	0	16000
SUB-TOTAL	98750	30500	22000	0	151250
4. IN-COUNTRY TRAINING					
Short Term Courses	104500	75000	42500	3000	225000
Discussion/Seminars	4500	0	1500	1500	7500
Sabbatical Studies	575	575	0	575	1725
Scholarships	240	240	480	0	960
SUB-TOTAL	109815	75815	44480	5075	235135
5. CONTRACT RESEARCH	132200	20000	43000	33500	228700
6. COMMODITIES	158000	70000	30000	5000	263000
TOTALS	708040	229540	205280	52900	1295760
PERCENTAGE	%	ERROR	ERROR	ERROR	100.00

PEST MANAGEMENT

INTRODUCTION

The term "pest" includes such diverse organisms as plant pathogens, insects, vertebrates and weeds. Pests are considered major constraints to increasing the production of food, fiber and livestock, especially in the sub-tropical and tropical regions.

Crop protection research has not maintained parity with associated sciences in the agricultural modernization process. Pest control technology, based largely on application of pesticides or exotic sources of host plant resistance, were assumed to be readily transferable from one geographic area to another without consideration of the often subtle differences imposed by ecological and socio-economic conditions of the recipient. This approach is now recognised as inadequate to support economically and socially viable crop protection programs throughout the world. Emphasis is shifting to the more rational approach of Integrated Pest Management (IPM): A systems approach to reduce pest damage to tolerable levels through a variety of techniques, including natural predators and parasites, genetically resistant hosts, environmental modifications and, when necessary and appropriate, chemical pesticides...relying first upon biological defenses before chemically altering the environment. The development of appropriate pest control technology through development of research programs in participating institutes, field trials, staff training and provision of necessary equipment are identified as the purpose of the pest management program area.

Within this frame of reference, together with the recommendations of review teams and the "Master plan for Bangladesh Agricultural Research Council", the following work plan has been developed for the three disciplines represented in Pest Management: entomology, plant pathology and vertebrate pest management (VPM). VPM is not an integral component of the project but has been evaluated in its external and internal reviews, and there is cooperation and linkage with the other program areas. It should be noted that some of the funding for VPM programs is from other sources and will not be reflected in the financial plan submitted herein.

PLANNED ACTIVITIES

A. Joint Entomology, Plant Pathology, Vertebrate Pest Management

1. A national plan for pest management will be developed with a particular focus on surveillance and monitoring, including guidelines for research on integrated crop protection and on survey systems appropriate to Bangladeshi agriculture.

The major thrust of this activity will take place in the final quarter of 1984-85, coinciding with the consultancies of an entomologist involved in development of a similar plan for the state of Texas and a Plant Pathologist expert in surveillance and monitoring for plant diseases. A document will be prepared to provide guidelines for research and for organization of systems to implement crop protection technology. Further activity is expected to carry over into 1985-86.

2. Descriptive and illustrative materials for preparation of guides to crop pests of Bangladesh will be assembled and maintained for inclusion in BARC publications on crop production with an ultimate objective of publication in a "Manual of Crop Pests" for use in training and extension activities.

A format for submission of material and requests for participation will be initiated in the second quarter of 1984-85. Lacunae will be identified and specific requests made, during the third quarter, for developing required inputs. The activity will be coordinated with the Agricultural Information program area.

3. Principles of IPM will be presented to selected staff from the Institutes, Research Stations and BAU in a 2-week in-country training workshop to be held in the third quarter of 1984-85 at BARI. Component analysis and identification of priority research goals will provide the participants with information that may be used in research programming. The Consortium for International Crop Protection will assist in planning, staffing and training.

B. ENTOMOLOGY

The work plan in insect pest management focuses on three principal activities:

- Organization of research into crop-oriented projects
- Improvement in research methodology
- Strengthening of research in insect toxicology and pesticides residues

1. Organization of research into crop-oriented projects

Entomological research at the BARI central and regional research stations will be organized into crop-oriented projects in concert with the coordinated approach developed at the Institute. Individual scientists will assume responsibility for a project, review experimental data and develop a project plan of research to (1) establish pest incidence monitoring techniques (2) develop crop loss indices and (3) evaluate pest control techniques consistent with IPM strategies.

This project approach to research planning is expected to help in identifying high priority research needs and in developing long range, systematic approaches to management goals. Assignment of scientists to specific crops is expected to promote professional competence in dealing with the pest complex of a crop and evolving a management system.

The program area will use the Specialist to assist in this activity. Other project inputs include overseas training, staff travel and contract research. One entomologist will be sent to ICRI/SAT for training in research methodology on pulses. A senior staff member will spend about two weeks at the same international center to review research programs on pulses and millets. While in India, he will also spend some time at IARI on fruit flies of cucurbits. An SSO will go to UPLB to review IPM on corn insects. Contract research projects are planned to strengthen work on major pests of crops covered under on-going projects in the Entomology Division (vegetables, coarse grains, pulses, cotton, and oilseeds).

2. With few exceptions, there is little understanding of principles and of research methodology for IPM. Staff training programs will be implemented to enhance research capabilities of scientific officers. These will include:

- (a) A 2-week in-country, training workshop on "Principles of Integrated Pest Management" to be held in the third quarter with assistance of the Consortium for International Crop Protection.

- (b) An entomologist will receive training (6 weeks) in maintaining insect cultures, including meredid rearing techniques, at IRRI, ICRISAT, or IARI.
 - (c) Two entomologists will receive training in economic insect identification - in a course being held in November-December in India by CIE.
 - (d) A one-week course will be held at BARI (or one of the RARS) for 25 entomologists on experimental design and analysis of field and laboratory experiments (Consultant).
3. Strengthening of research in insect toxicology and pesticides residues.

This economically important area of entomological research has been neglected, and steps are planned to strengthen it.

A consultant will spend about 6 weeks reviewing insect toxicology facilities in Bangladesh, and develop a plan for a research facility and program for BARI (first quarter). Mr. Nazrul Islam (BARI) is in an MSc program in insect toxicology at Central Luzon State University, the Philippines (due back early 1987). The toxicology laboratory at BARI will be renovated and additional priority equipment provided in anticipation of the return of Mr. Islam. A screen house with insectary is needed at BARI for maintaining cultures of insects for toxicological screening trials and host plant resistance work. Project support is planned for this facility. Working plans and specifications will be prepared during the second quarter.

4. Other Activities

General staff improvement is taking place under project support in the form of (a) MS training in the USA for an entomologist to receive training in host plant resistance and (b) scholarships. Md. Quadrat-E. Khuda and Md. Nasiruddin have been selected for PhD programs in entomology at BAU. Zabunessa, SO at BARI, was admitted to BAU in 1983 for an MSc program in entomology, and is expected to complete the work in 1986.

Additional laboratory and field equipment are required to carry out the described activities, including sprayers, deep freezers, bio-climatic chambers, and motorcycles.

C. Plant Pathology

Most of the planned activities in this program are aimed at improving the research capabilities of the Division of Plant Pathology, BARI in order for it to better respond to the research priorities set in the National Agricultural Research Plan 1984-1989. Advice and assistance will be given to the Head and staff in planning, implementation and monitoring of research projects in plant pathology at BARI, Joydebpur and at the BARI regional agricultural research stations (RARS). Emphasis will be given to the following areas: screening for disease resistance; all aspects of IPM, including crop loss assessment, surveillance and monitoring; diseases of stored seed; and seedborne diseases.

Towards improving BARI research capabilities, formal training courses, in Bangladesh and abroad, in pertinent topics will be attended by BARI plant pathologists. Also, senior staff will visit other research institutes in the Asian region to survey and assess on-going research programs relevant to the research priorities of Bangladesh.

1. Crop loss assessment, as well as surveillance and monitoring, are major components of successful IPM programs; crop loss assessment is also a valuable tool for establishing research priorities. In order to provide the BARI program with the capability to conduct valid research in these subject areas, the following activities are planned:

- (a) two BARI scientists (one plant pathologist and one entomologist) and the IADS plant pathology specialist, will attend an intensive, two-week course on crop loss assessment at the University of Minnesota in July 1984; following this course, the BARI scientists will also make a 10-day visit to Texas A&M University to survey IPM research programs there in their relevant disciplines.
- (b) a two-week training course in IPM will be held at BARI in January-February, 1985 (see para 3 in Joint Activities above).
- (c) two senior scientists in pest management will make a one-month tour of Asian-region research institutes to review on-going IPM and crop loss assessment programs.
- (d) a consultant expert in surveillance and monitoring techniques for plant diseases will advise BARI staff on this subject area in conjunction with a one-month consultancy (April-May 1985) related to the BARC surveillance and monitoring program (see para 1 in Joint Activities above).

1. a contract research proposal for the development of a methodology for assessment of crop losses in a major crop due to a major disease will be prepared by a BARI plant pathologist and submitted to BARC for funding.
2. A well-rounded research group in plant pathology must contain well-trained scientists specialized in various sub-disciplines of the science, e.g., plant virology, nematology, IFM, the study of soil-borne diseases, and others. Viruses, nematodes and soil-borne fungi pathogenic to plants constitute serious constraints to optimum food production yet there is a shortage of staff at BARI trained to conduct research to overcome these constraints. In order to develop a trained staff of scientists at BARI in the subject areas mentioned above, the following activities are planned:
 - (a) a MSc degree candidate from BARI is being trained in mycoplasma diseases of citrus at the University of the Philippines, Los Banos (UPLB),
 - (b) one BARI plant pathologist will be sent to a major university in the USA for a 3-month course in nematode taxonomy,
 - (c) one senior BAU nematologist currently studying for a PhD degree in plant pathology in-country will travel to IARI/UPLB for discussions with working nematologists and to conduct a literature search (not possible in-country) relating to his dissertation topic,
 - (d) a contract research proposal for research on the economic control of nematode-caused diseases of Bangladesh will be submitted to BARC for funding,
 - (e) funding will be requested for out-of-country degree training for one PhD candidate in seed pathology,
 - (f) the IMDS specialist will instruct and advise 4 BARI scientists in research programs underway on the control of soil-borne diseases, i.e., Control of Soil-Borne Pathogens by Soil Pasteurization and Screening for Biological Control Agents of *Sclerotium rolfsii*,
 - (g) two plant pathologists have received scholarships for in-country degree (one PhD candidate from BAU and one MSc candidate from BARI) and will start their programs during FY 84-85.

- (h) a BARI scientific officer will receive training (probably at the Indian Agricultural Research Institute) in techniques related to the development and maintenance of a plant disease herbarium.
3. Training is required to meet obligations in on-going research programs for specific crop areas.
 - (a) one BARI plant pathologist will receive 2-3 months specialized training in pulse diseases at ICRISAT,
 - (b) one BARI plant pathologist will receive 2-3 months specialized training in the Philippines on diseases of coconut and other palms, with emphasis on cadang-cadang disease.
 4. Training in the philosophy and administration of plant disease diagnostic clinics will be done by an expatriate consultant and the IADS specialist during the third quarter of fiscal year 1984-1985. It is presently planned to hold two major, one-week training sessions, one at BARI-Joydebpur and one at BARI RARS-Ishurdi, followed by visits to the RARS's at Jessore, Jamalpur and Hathazari for individual consultation. This training will be given to approximately 40 plant pathologists and administrators overall. Training will also be given in plant disease diagnostic techniques with emphasis on procedures not using sophisticated equipment.

The objective is to provide a professional, cohesive and responsive service to the Bangladeshi growers, including diagnosis of problems and recommendations for problem-solving. Ultimately, the extension sector should administer this program; however, diagnostic expertise will remain with the researchers at BARI, Joydebpur and at the RARS's. This training should focus and refine the diagnostic services already offered through the BARI research group.

5. Farming systems research (FSR) has been conducted in Bangladesh and other countries with pest management being ignored or only briefly considered. With the increasing emphasis on FSR, through either BARC or BARI, plant pathologists will play a role both in the planning and implementation stages. During fiscal year 1984-1985, the IADS specialist will serve as a member of the BARC, FSR planning committee. Also, it is planned that the Head, Division of Plant Pathology, will visit several Asian Research Institutes for one month in the fourth quarter of

FY 84-85 to survey existing FSR programs and related research in pest management. The objective will be to provide FSR in Bangladesh with a coherent pest management component and ultimately to provide the farmer beneficiaries of FSR with a more comprehensive, easier-managed cropping system.

6. The term seed technology covers a variety of research and management activities spanning many scientific disciplines, e.g., physiology, agronomy, entomology, agricultural engineering, and plant pathology. In Bangladesh, there are several institutes and many trained personnel involved in different aspects of seed technology, but there is no feeling of a coordinated program and it is difficult to assess the effectiveness of the existing programs. Research in seed and grain pathology in the field and in storage, and in seed-borne diseases (seed sanitation) are major aspects of a good seed-technology program. In order to better define the seed program as a whole and the research role of the plant pathologists in the program, the following activity is planned:

- a. two local consultants contracted for BARC Member-Director for Crops will conduct a comprehensive study and report on the status of seed technology and grain storage in Bangladesh. This report will provide a basic planning document for BARC and for anticipated expatriate consultants in FY 84-85. The expatriate consultant will provide recommendations to BARC on future research needs in the area of seed technology, including seed pathology.

7. A listing of plant diseases to be found in a particular geographical area is an essential tool of the plant pathology researcher or diagnostician. A project to survey plant diseases, conducted by Division of Plant Pathology, BARI, will be completed in June 1985. In order to incorporate the findings of this survey, and information from other sources, into a plant disease index for Bangladesh, a contract proposal including a local consultant will be submitted to BARC for funding with implementation by BARI.

8. Materials and equipment are essential to a productive research program. The BARI plant pathology program is seriously deficient in several areas:

- (a) The research libraries in Bangladesh, especially at BARI, are very limited in holdings on pest management; it is very difficult to conduct meaningful, up-to-date research without a proper literature base for review. Funds for purchase of journals and reference books, as well as outright donations of journal sets, will be solicited.
- (b) The present nethouse facilities at BARI are not adequate to support the research program. A new nethouse is urgently needed to provide facilities for year-around screening of plants for resistance to foliar pathogens. Funds will be requested through a contract research proposal, on screening for disease resistance, for construction of a nethouse.
- (c) Much equipment and supplies are still required to provide the basic needs for a plant pathology research laboratory at BARI, Joydebpur and at each of the 4 major RARS's, as well as the smaller, specialized research stations, e.g., coconut, citrus and tobacco. A revised listing will be made of materials on-hand, ordered and still required. If funds become available, equipment and materials will be ordered to fill existing needs.
- (d) Replacement of outworn netting with smaller mesh netting is required to make the existing plant virology nethouse a barrier to virus-carrying insect vectors. Funds will be solicited from ARP Phase II.

D. Vertebrate Pest Management

1. Rodent control in farmers' wheat fields will be studied to develop baiting methods suitable for use by farmers and to evaluate the relative efficiency of three poisons. The study will start in January and end in March 1985. Output will be a technical report and a published paper of the results. Probable site for studies is Gazaria Upazila.
2. Initiate a study on the life history, distribution and agricultural importance of the short-tailed mole rat, which rodent occurs only in western Bangladesh where it is locally important as a pest of sugarcane and root crops. The study will start in November 1984 and continue monthly for at least one year. Results will be prepared as a technical report and a scientific paper. Control methods for farmer-use may develop from this study.

3. Develop methods of estimating small mammal populations in farmers' houses, so that estimates of stored food losses can be indirectly derived. This study started in June and will terminate in May. Output will be an estimate of stored food losses per farmers' household, a technical report and a published paper.
4. Develop methods of direct measurement of post-harvest stored food losses in farmers' houses due to rodents. This is a pilot study to develop methods, to be carried out in cooperation with FAO and BIRRI. The study will start in November/December and terminate three months later. Output will be the development of a relatively simple method of measuring total stored food losses from farmers' storage containers due to rodents, plus a technical report and a published paper on the methodology.
5. Design and implement laboratory and field evaluations of scaring devices, chemical repellents and traditional methods of pest bird control in sprouting wheat, and maturing maize, foxtail millet and sunflower. The purpose is to reduce pest bird damage in farmers' fields and to experimental crops at research stations.

Sprouting wheat studies will begin in late October 1984 in farmers' fields near Jessore and end in March 1985. Field tests in maturing maize, fox-tail millet and sunflower will depend upon planting dates at Jessore, Ishurdi, Dinajpur and Joydebpur but mainly will be carried out in March to May.

Laboratory studies of the repellency of several chemicals to pest birds will begin in October and finish in January 1985 at the VPS facility at Joydebpur, BARI.

Outputs will be possible development of a commercially-feasible chemical repellent. All results will be prepared as technical reports and the most significant studies will be published.

6. Special studies will be done in the winter season, January through May 1985, on protection of litchi and tomato crops in the Chittagong area from pest bird damage. Physical barriers, scaring devices and chemical repellents will be evaluated in the field. Output, hopefully, will be development of methods to protect these crops that are economically feasible. Results will be prepared as technical reports.

7. Damage assessment methods will be developed and evaluated for vertebrate pest damage to wheat, maize, sunflower and sugarcane. The purpose of these studies is to measure accurately the impact of vertebrate pest damage on crop yields and to determine the crop growth stage at which control measures should be started to derive the most benefit. Studies will start in February and continue until June. Output would be sampling/damage assessment methods and estimators of economic thresholds for vertebrate pest damage control. Results will be prepared as technical reports.
8. Assess the agricultural and economic importance of jackals to Bangladeshi farmers. Using an interview questionnaire, this on-going survey will be concluded by December. The results will allow us to estimate the country-wide importance of jackals in damage to food crops and livestock, set research priorities for this pest species and design control strategies. A technical report and published paper will give details and analyses of findings.
9. Field-oriented vertebrate pest training in crop damage assessment methods and vertebrate pest control will be conducted by the VPS staff for BARI regional and sub-regional scientists to protect experimental plots from pest damage. These will be one-day seminars done on-site. Training will start in November and continue until January. Approximately 20 to 25 research stations will be visited.
10. One-day training seminars for Subject Matter Specialists (SMSs), Plant Protection, of the Agricultural Extension Department will be held in the period March to May. About 50 SMSs will participate. The main objectives are to inform the SMSs on current methods to protect sprouting crops, such as wheat, rice and maize from pest bird damage, using simple, inexpensive bird repellent chemicals, and to provide them with training materials, brochures and farmers leaflets that are to be distributed down to block supervisor level. The output will be a better informed group of SMSs about pest bird problems in sprouting crops and methods that can be transferred to farmers to protect crops.
11. A training manual for agricultural extension personnel will be prepared in collaboration with the Agricultural Information Service and printed in Bengali on the subject of vertebrate pest identification, methods of assessing vertebrate pest damage to field crops and simple methods of

vertebrate pest control that can be done by farmers. Work has already started on this manual and a target date for completion is set at June. Output will be the production of 2,000 copies of this manual and their distribution.

12. A 4-day international workshop on "Vertebrate Pest Management in South and Southeast Asia" will be sponsored by BARC/BARI and held at the BARI campus in April/May 1985. Some 15 scientists and control specialists will be invited to attend. Subjects covered will range from vertebrate pest damage estimates from each country, pest research in each area, vertebrate pest control methods used, damage assessment methods used, how to transfer research technology to the farmer and how to improve information exchange between scientists and control specialists within the south and southeast Asian region. Papers presented will be organized into a proceedings to be published after the workshop. The net output should be the beginnings of a vertebrate pest information network in the region.
13. Staff improvement. Two study tours are planned to the USA for vertebrate pest section staff members to improve their capabilities in vertebrate pest management, research and control. One is a 6-month study of the Denver Wildlife Research Center (DWRC), Colorado and its associated field stations in the USA, to start in April 1985 and return in September 1985. All aspects of vertebrate pest management would be taken up on this study tour (rodents, birds, carnivores and wild pigs). A second 2-month study tour to the DWRC, Colorado, and DWRC's field stations in Utah and Texas to study coyote research and management techniques during the period April to May. These techniques will directly bear upon our future work on jackals in Bangladesh. Staff capabilities in this area will be benefited.
14. Construction began on the aviary at the Vertebrate Pest Section Facility at BARI, Joydebpur on mid-July. The aviary is to house pest birds for experimental purposes. Completion is expected by mid-September. Cost estimated \$8,000 funded under Farm Development Division of Technical Support.

PROJECT SUPPORT

1. Specialists and Consultants

*137,850

** Specialists:

Person-months 24.0 (1994-95)

* Entomology Specialist

Person-months 12.0

* Plant Pathology Specialist

Person-months 12.0

* Vertebrate Management Specialist *

Person-months 12.0

** Consultants

* Consultant on Insect Toxicology

Person-months 1.5

Timing: September 1994 -
November 1, 1994

Terms of Reference: To
review insect toxicology
facilities in Bangladesh
and develop a plan for
research facility and
program for BARI.

* Consultant on Entomology Research Programming, Design and Evaluation

Person-months 1.0

*/ The Vertebrate Pest Management Specialist is not supported by
the project but will make inputs for the 12 months period of
1994-95.

Terms of Reference: To present a 1 week course in experimental design for entomology research and assist in development of research projects.

* Consultant on Pest Surveillance

Person months 3.0

Timing: March 15 - June 15, 1985

Terms of Reference: To review and evaluate the pest survey activities in Bangladesh in relation to local agricultural practices, manpower, and research base and assist in developing a national research plan for pest management.

* Local Consultant on Pest Surveillance and Monitoring

Person-months 4.0

Timing: March 1 - June 30, 1985

Terms of Reference: To work with the expatriate consultants on Pest Surveillance and local resource assessment.

* Consultant on Pest-Bird Problems

Person-months 1.75

Timing: April 1-21, 1985.

Terms of Reference: Evaluation of bird control in seed beds and maturing food crops, and control techniques, and to quantify pest bird damage to food crops in Bangladesh.

* Consultant on Jackal Research

Person-months 1.25

Timing: Jan. 15-Feb 20, 1985.

Terms of Reference: To assist in training staff and in developing research methodology on damage and control techniques.

- * Consultant on Pest Surveillance for Plant Diseases

Person-months 1.0

Timing: April 15 - May 15, 1985

Terms of Reference: To review and evaluate the procedures for plant disease survey and monitoring in Bangladesh in relation to local agricultural practices, manpower, and research base and to assist in developing a national pest surveillance and monitoring research plan.

- * Local Consultants on Seed Technology

Person-months 4.0

Timing: January 15 - March 15, 1985

Terms of Reference: To conduct a comprehensive study with report on the state of seed technology and grain storage in Bangladesh.

- ** Local consultant to finalize preparation of a disease index for Bangladesh.

Person months 3.0

Timing: June 1, 1985

Terms of Reference: To consolidate, format and edit the raw information provided by disease surveys and literature reviews. Funded under contract research

2. Local Support

\$ NONE

3. Overseas Training

\$114,900

** PhD in USA

\$NONE

* Training in host plant
resistance to pathogens.
Candidate and institution
not yet selected. Starting
date Sept. 1, 1985,
termination date August 31,
1989. Person months in
1984/85 0.0

\$ NONE

* Training in seed pathology.
Candidate and institution
not yet selected. Starting
date Sept. 1, 1985,
termination date Aug. 31,
1989.
Person months in 1984/85 0.0

\$ NONE

** PhD in TWC

\$ NONE

** MS in USA

\$15,000

* Training in Host Plant
Resistance to Insects.
Candidate and Institution
not yet selected. Starting
date June 1985, Termination
date July 1987.
Person months in 1984/85 0.0

\$NONE

* Mrs. Parvin Sultana,
Colorado State University,
Ft. Collins, Colo. Degree
in pest bird research and
management, started March
83, ending in September
1985. 12 Person months.

\$15,000

** MSc in TWC

\$4,700

* Nazrul Islam, Central
Luzon State University,
Philippines, Insect
Toxicology. Training
began in July 1984;
Termination date January
1987. 12 months in 1984-
1985 funded under water
management.

- * Mr. Ashraf Khan, University of the Philippines at Los Banos, physiology and epidemiology of citrus greening disease caused by a mycoplasma. Training relates to upgrading plant pathology sub-discipline, plant virology, started June, 1983, will terminate December 1985. 12 months in 1984-85. \$4,700.
- * Two candidates have been nominated by Director, BARI, from staff members of the Vertebrate Pest Section, for degree studies in Economic Ornithology in either India or the Philippines. Starting date is tentatively set for June 1985. Termination date Dec. 1987. Person months in 1984-85 0.0 \$ NONE
- ** Up to 6 months in USA \$ 31,200
- * Three scientists will be sent to the University of Minnesota in Jul. 1984 for 2 weeks intensive training in crop loss assessment. Person Months in 1984-85 1.5 \$12,300
- * One plant pathologist will be sent to a major USA University (probably Clemson) for 3 months in June-August 1985 for intensive training in the taxonomy of plant-pathogenic nematodes. Person Month 1.0 \$ 7,900
- * One candidate will be nominated to study all aspects of vertebrate pest research and management (rodents, birds, jackals, porcupines, squirrels and wild pigs) to improve staff capabilities in these program areas. The studies would be carried out at the Denver Wildlife Research Center (DWRC), Colorado and at

several of DNRD's field stations in the USA.

Starting date of studies is April 1985 and ending date is September 1985.

3 person-months \$10,700

** Up to 6 months TWC \$22,600

- * One entomologist will be selected for 6 weeks training in maintaining insect cultures, including meretric rearing techniques at IPRI, ICRISAT, or IARI. Fourth quarter 1984-85.

Person months in 1984/85 1.5 \$3,400

- * A training program in economic insect identification is being held in India by CIE in November-December 1984. Two candidates, yet to be selected, will be supported by IADS funds.

Person months in 1984-85 4.0 \$8,200

- * One entomologist will be sent to ICRISAT for 2 months of participant training in research methodology on pulses in the last quarter of 1984-85.

Person months in 1984/85 2.0 \$2,400

- * One plant pathologist will be sent to a Philippine Coconut Research station for 2-3 months in the 3rd quarter of FY 84/85 to study Cadang-Cadang disease.

Person Months in 1984/85 2.0 \$2,700

- * One plant pathologist will be sent to ICRISAT for 2 months training in pulse disease assessment in May-June 1985.

Person months in 1984/85 2.0 \$2,900

- * One plant pathologist will be sent to IARI for 2 months training in plant disease herbarium techniques during the 3rd quarter FY 84-85.
Person Months in 1984-85. 2.0 \$2,950
- ** International Conferences \$5,400
 - * International conferences provide a forum for interchange of ideas among scientists. None have been identified at this time; however, budget allocations should be provided for 6 participants to attend crop protection conferences that may occur in Asia in the 1984-85 year. One week per participant.
Person Months 1.5
- ** Staff Travel \$36,000
 - * Following the Crop Loss Assessment course in the USA, the PSO Entomology and PSO Plant Pathology will make an observational tour in Texas of 2 weeks to review IPM programs and virus diseases, respectively.
Person months \$8,000
 - * A senior staff member will visit ICRISAT and IARI for up to 2 weeks to review the research programs on insect pests of pulses, millets and fruit flies on cucurbits.
Person months 0.5 \$2,000
 - * One PSO Entomology will be sent to UPLB and IPRI for 2 weeks to review IPM on corn insects.
Person Months 0.5 \$2,000

* Two senior staff will be sent on a one-month tour to review IPM and crop loss assessment programs in Asian research institutions during 4th quarter, FY 84/85.
Person months 2.0 \$0,000

* One senior staff member will visit Asian research institutes to review pest management aspects of Farming Systems Research. A four week tour including IRRI, ICRISAT, Thailand and UPLB is planned for 4th quarter FY 84-85
Person months 1.0 \$3,900

* One senior nematologist will travel to IRRI/UPLB for literature review and review of research in 3rd quarter FY 84-85 for 3 weeks (0.75 Person months)
\$2100

* One senior staff member from the Vertebrate Pest Section will be nominated for a two-month study tour of coyote research and management techniques at the Denver Wildlife Research Center (DWRC) and DWRC field stations in Utah and Texas, USA. The training will be directly applicable to jackal problems in Bangladesh and should improve the staff capabilities in this problem area. Tour to start in April 1985. Person-months 2.0 \$10,000

4. In-Country Training \$73,250

** Short-Term Courses \$44,100

* There will be a 1 week course in January or June 1985 at BARI or RARS Ishurdi for 25 Entomologists from "

- Research Institutes and Regional Stations on experimental design and analysis of field and laboratory experiments. An expatriate consultant will provide the training expertise. \$5,100
- * Two training courses of 1 week duration, on plant disease diagnosis, to be held in January 1985 for researchers and senior extension officers. Training will be done by an expatriate consultant. \$12,000
 - * A 2 week training course on IPM principles will be held in January-February 1985 at BARI for 30 crop protection research scientists. CACP will assist in organizing, staffing and training. \$27,000
 - ** Discussion/Seminars \$27,500
 - * A 1-day training course in Vertebrate Pest Management will be held at DARI in March to May 1985 for about 50 SMS in the Plant protection Directorate of the DAE. \$2,500
 - * A total of 20-25 1-day field training programs will be held at BARI Regional and Sub-Regional stations on control assessment of damage by vertebrate pests. UPS staff will provide training. \$10,000
 - * A 4-day regional discussion group in vertebrate pest management in south and S.E. Asia will be held in April/May 1985 in Dhaka or Joydebpur. Some 10 persons will be brought from India, Pakistan, Nepal, Sri Lanka, Burma, Thailand and Malaysia to join Bangladeshi scientists. \$15,000

** Sabbatical Studies

\$ NONE

** Scholarship

\$ 1,400

* Md. Nasiruddin, SSO, BARI,
selected but not yet admitted
to BAU for PhD in Entomology. \$ 400

* A.K.M. Budrat-E-Khuda,
selected but not yet
admitted for PhD in
Entomology. \$ 400

* Zabunessa, SO, BARI, admitted
to BAU in 1983 for MSc in
Entomology. Completion date
in 1986. (on-going) \$ 200

* Myeenuddin Ahmed, Asstt.
Prof., BAU awarded but not
yet admitted for PhD in
Plant Pathology. \$ 240

* Mahbub Uddin Ahmed, SO,
BARI awarded but not
yet admitted at BAU for
MSc in Plant Pathology. \$ 400

5. Contract research

\$147,500

** Contract research proposals
will be developed to support
insect monitoring techniques
and action thresholds for
major pests of each project
in Entomology for a two year
period. Total budget \$48,000. \$18,000

* Vegetables, including
cucurbits, broccoli and
cabbage, brinjal. Total
of 3 under direction of
Md. Nasiruddin, SSO, BARI
for a period of two years. \$4,500

* Coarse Grains: Corn and
cheena. Total of 2 under
the direction of Suhel A.
Chowdhury for period of
two years. \$3,000

- * Pulses: Mashkalai and mung, Bengal gram, arhar. Total of 3 under direction of G.P. Das, Humayun Kabir (Jamalpur) and Dr. I. Ali (Jessore). \$4,500
- * Cotton: 1 under Dr. I. Ali (Jessore) \$1,500
- * Oilseeds: 1 under Dr. M.A. Karim, BARI \$1,500
- * Storage: 2 under PSO, Joydebpur \$3,000

Starting date will be the season after approval of the research proposal and research will continue for 2 years/seasons. Target date for initiation is January 1985.

- ** Survey of Insect Pathogens Associated with Pulses, and Cotton - Dr. I. Ali, Jessore, Dr. J. Alam, Salna, are principal investigators. The project will be initiated as soon as funding becomes available and will continue up to June 30, 1987. Target initiation date is January 1985. 4500 total budget \$ 6,000
- ** An Evaluation of Pheromones for Monitoring and Control of Potato Tuber Moth. Research in cooperation with Debriganj Sub-Station under the direction of Dr. M.A. Karim, CSO, Joydebpur. Initiation in third quarter 1984-85. Termination in fourth quarter 1985-86. 4500 total budget. \$ 1,500
- ** Preparation and publication of a plant disease index for Bangladesh. The principal investigator to be Dr. Hamizuddin Ahmed, Head.

Division of Plant Pathology,
BARI. Project proposal yet
to be written and submitted.
Target initiation date is
June 1985. Total budget 3,000

\$ 500

** Economic control of nematode-
caused plant diseases in
Bangladesh. The principal
investigator to be Dr. Ismael
Miah of Jessore RARS, BARI.
Proposal to be submitted in
2nd quarter of FY 1984-85;
target initiation date is
3rd quarter of FY 1984-85.
Initial phase to terminate
June 1986. Total Budget
16,000.

\$ 4,000

** Screening for disease
resistance in cereals,
pulse, and oilseeds of
major crops against foliar
pathogens, under controlled
environmental conditions.
The principal investigator
to be Dr. Hamizuddin Ahmed,
Head, Division of Plant
Pathology, BARI. Proposed
to be written, submitted
and initiated by March 1985.
Initial phase to terminate
June 1986. Total budget 3,000

\$ 1,000

** Development of a methodology
for assessment of crop losses
in a major crop due to a
major disease. The principal
investigator to be Dr. Kazi M.
Ahmed, PSD, Division of Plant
Pathology, BARI. To be initiated
by August 1985 and initial phase
terminated June 1986. Total
budget 3,000.00

NONE

** The life history, nesting
habits and agricultural
importance of the rose-ringed
parakeet in the Chittagong
area. A proposal for this
study will be prepared
and awarded to a competent
investigator at the Department
of Zoology, Chittagong

University. This will be a 1-year study, to start June 1985. Total budget 5,000

\$2,500

- ** Coordinated crop protection project for evaluation of IPM technology. From Jan. 85 to June, 86. Total budget 30,000 coordinated by BARC and implemented by BARI, SRTI, BRRI, BJRI and EAU.

\$10,000

6. Commodities:

\$85,100

- * Funds committed for purchase of Baby Taxi

\$ 2,000

- * 1982-84 committed costs for lab. equipment for BARI Joydebpur and RARD

\$81,100

- 3* Funds will be required to renovate and equip the toxicology laboratory at BARI Joydebpur prior to the return of the MSc being trained in the Philippines. Specific requirements will be developed in the second quarter of 1984-85 by a short-term Toxicology Consultant. Budget requirements estimated to be: \$ 75,000

- 2* Additional laboratory and field equipment are required for the Entomology Division Joydebpur and Entomology Section of RARS's. Comprehensive lists are not available but will be prepared in the second quarter and will include such items as: sprayers, deep freezers, bioclimatic chambers, scales, micron applicators, blenders and motorcycles at each location. Estimated budget is: \$ 50,000

- 2* Renovation of existing laboratory and office space at Entomology Division, BARI is estimated to cost: \$ 25,000
- 2* Basic laboratory equipment for plant pathology research is needed at all the BARI, PARS as well as at Jordebpur. Specialized laboratory equipment is needed at Jordebpur for work in the sub-disciplines of plant virology, nematology, plant bacteriology and soil borne diseases. Lack of this equipment limits severely the scope and modernization of research programs in plant pathology. These items were identified and requested in FY 1983-84 but were not purchased due to budgetary restriction. At least one 4-wheel drive vehicle is required to facilitate administration and research in the BARI nationwide program in plant pathology. \$50,000
- 2* Up-to-date reference books and relevant journals in pest management are needed for the BARI library. \$ 5,000
- 2* Netting needs to be replaced on the plant virology nethouse at BARI so as to exclude insect vectors of plant pathogenic viruses. The netting should be replaced with 52 mesh which will screen out leafhopper and aphid nymphs. \$ 3,000

7. Construction

NONE

- ①* A conference room/library complex is needed as an addition to the existing vertebrate pest office/laboratory building at BARI, Jordebpur, to relieve staff crowding.
- ②* One glass-roofed nethouse with attached headhouse is required at BARI to provide isolated work areas for plant pathology, primarily for variety screening but also to provide a semi-controlled environment for other experiments. Netting must be small enough to screen out most insects (52 mesh).
- ③* A screenhouse with insectary is necessary for maintaining cultures of major insects pests, toxicological screening trials, biological/ecological studies, and host plant resistance selections. The menedic rearing work will be accommodated in this facility. A similar structure is needed in plant pathology and consideration will be given for construction of a joint unit to share common facilities such as for soil sterilization and potting. Estimated cost \$25,000.00

TOTAL

\$510,700

* Note: Funds are no longer available from these requested items. These activities will not be implemented unless funds are transferred from another line item budget.

SUMMARY OF BUDGET ESTIMATE FOR 1984-5

TABLE 1

BUDGET CATEGORY	FISCAL BUDGET 30.4.05
SPECIALISTS	145500
CONSULTANTS	610125
LOCAL SUPPORT	395000
OVERSEAS TRAINING and TRAVEL	912000
IN-COUNTRY TRAINING	741300
CONTRACT RESEARCH	436375
EVALUATION	15000
COMMODITIES	1135070
CONSTRUCTION	69000
IAS STAFF EXP.	90000
DIRECT COSTS	5860070
MANAGEMENT FEE	965391
PROCUREMENT FEE	79455
CONTINGENCIES	250000
PRE-CONTRACT EXP	0
TOTALS	7154916 =====

AGRICULTURAL RESEARCH PROJECT PHASE II
BUDGET COMPARISON STATEMENT

Table 2

FOR THE FISCAL YEAR ENDING 30 JUNE, 1985

BUDGET CATEGORY	TOTAL PROJECT BUDGET 1982-86	ACTUAL COSTS 30/6/84	BUDGET BALANCE 30/6/84	FISCAL BUDGET 30/6/85	COMMITTED FUNDS 7/85-9/89	BUDGET EXCESS (DEFICIT)
SPECIALISTS	7821000	2869141	4751859	1455600	0 (1)	3296759
CONSULTANTS	1517000	531709	985291	610125	202375	172791
LOCAL SUPPORT	1091000	552409	538591	395000	0 (1)	143591
OVERSEAS TRAINING and TRAVEL	2261000	455789	1805211	912600	1282700	-390081
IN-COUNTRY TRAINING	1135000	104052	1030948	741300	59425	230223
CONTRACT RESEARCH	1350000	255287	1094713	486375	642500	15836
EVALUATION	80000	5402	74598	15000	0	59598
COMMODITIES	2170000	948773	1221227	1135070	0	86157
CONSTRUCTION	170000	100895	69105	69000	0	105
IADS STAFF EXP.	271000	208561	62439	90000	0 (1)	-27561
DIRECT COSTS	17866000	6032018	11633982	5860070	2187000	3586912
MANAGEMENT FEE	2908000	954067	1953933	765391	345546	642995
PROCUREMENT FEE	152000	66420	85580	79455	0	6125.1
CONTINGENCIES	1049000	0	1049000	250000	0	799000
PRE-CONTRACT EXP	25000	25000	0	0	0	0
TOTALS	21800000	7077505	14722495	7154916	2532546	5035033

See Table 4 See Table 3

NOTE:

(1) Estimated cost for technical, local and IADS headquarters support have not been calculated.

EXPECTED COMMITMENTS OF FUNDS AND TIME
BEYOND THE FISCAL YEAR ENDED JUNE 30, 1985.

	AMOUNT US \$	TOTAL
1) OVERSEAS TRAINING - DECREE TRAINING		
A] Ph.D in USA 8/83 - 8/87 candidates	106,000.00	
9/85 - 9/89	445,000.00	601,000.00
B] Ph.D in TWC 5/83 - 5/87 candidates	33,000.00	
6/85 - 6/89	21,200.00	54,200.00
C] MSc. in USA 83-86 candidates	54,000.00	
9/85 - 3/88 candidates	429,000.00	483,000.00
D] MSc in TWC 83-84 candidates	53,500.00	
6/85 - 12/87 candidates	91,000.00	144,500.00
TOTAL :		1,282,700.00
Committed as of June 1984	\$ 246,500.00	
Additional Commitment	\$1036,200.00	

EXPECTED COMMITMENTS OF FUNDS AND TIME
BEYOND THE FISCAL YEAR ENDED JUNE 30, 1985.

B.F. Page 1		\$ 1,282,700.00	
2]	In-Country Training. -Degree Training		
A]	Ph.D		
	2/84 - 2/88 candidates	2,450.00	
	2/85 - 2/89 candidates	19,000.00	21,450.00
B]	M.Sc		
	83/84 candidates	-0-	
	2/85 - 7/86 candidates	19,000.00	19,000.00
C]	Sabbaticals	18,975.00	\$ 59,425.00
3]	Consultants (25% of expected costs of 1984-85)		\$ 202,375.00
4]	Contract Research		
	83/84 Projects	95,000.00	
	85/86 requests	547,500.00	642,500.00
	Consists of:		
	IWM	313,000.00	
	OTHER	329,500.00	\$ 642,500.00
TOTAL :			\$ 2,187,000.00

AGRICULTURAL RESEARCH PROJECT PHASE II
ANNUAL FINANCIAL PLAN 1 JULY 1984 - 30 JUNE 1985
SUMMARY OF PROGRAM AREA BUDGETS (IN US DOLLARS)

Table 4

	I	II						
		TECHNICAL SUPPORT						
BUDGET CATEGORIES	RESEARCH SYSTEMS MGMT	FARM DEVELOP MENT	EQUIP MAINT	TRAINING	INFO LIBRARY	PROGRAM AREA	PROGRAM*	PAGE TOTAL
							SUBTOTAL*	
SPECIALIST & CONSULTS	242450	10825	76500	49000	103050	239375		481825
LOCAL SUPPORT								
Local Employees	109000	NA	NA	NA	NA	0		109000
Local Consultants	0	NA	NA	NA	NA	0		0
Office Operations	102000	NA	NA	NA	NA	0		102000
Research Supl/Equip	12000	NA	NA	NA	NA	0		12000
Household Furniture	4000	NA	NA	NA	NA	0		4000
Vehicle Operation	52000	NA	NA	NA	NA	0		52000
In-Country Travel	24000	NA	NA	NA	NA	0		24000
Internal Evaluation	0	NA	NA	NA	NA	0		0
Rents and Utilities	8500	NA	NA	NA	NA	0		8500
Miscellaneous	46000	NA	NA	NA	NA	0		46000
OVERSEAS TRAINING								
Ph.D Study USA	0	0	0	0	0	0		0
Ph.D Study TWC	0	0	0	0	0	0		0
M.S. Study USA	11600	0	0	0	0	0		11600
M.S. Study TWC	0	0	0	0	0	0		0
Up to 6 Mo.USA	27200	0	0	0	13700	13700		40900
Up to 6 Mo.TWC	1300	0	3000	0	0	3000		4300
Int'l Conferences	12150	0	0	0	7400	7400		19550
Staff Travel	20000	0	0	0	2500	2500		22500
IN-COUNTRY TRAINING								
Short Term Courses	172600	0	3400	0	4200	7600		180200
Discussion/Seminars	0	0	0	0	0	0		0
Sabbatical Studies	575	0	0	0	0	0		575
Scholarships	0	0	0	1490	0	1490		1490
CONTRACT RESEARCH	0	0	0	0	0	0		0
EVALUATION	15000	0	0	0	0	0		15000
COMMODITIES/CONSTRUCT								
COMMODITIES	195000	64760	21690	13300	55010	154760		349760
CONSTRUCTION	0	69000	0	0	0	69000		69000
CONTINGENCIES	250000	0	0	0	0	0		250000
PROGRAM AREA TOTALS								
	1305375	144585	104590	63790	185860	498825		1804200
PERCENT OF BUDGET BY PROGRAM AREAS								
	21.68	2.40	1.74	1.06	3.09	8.29		29.97
								148

AGRICULTURAL RESEARCH PROJECT PHASE II
ANNUAL FINANCIAL PLAN 1 JULY 1984 - 30 JUNE 1985
SUMMARY OF PROGRAM AREA BUDGETS (IN US DOLLARS)

Table 4

	III	IV	V				
				CROPS			
BUDGET CATEGORIES	FARMING SYSTEMS	AGRIC ECON & SOC	AGRONOMY SCI	CROPS	HORTI- CULTURE	PROGRAM AREA SUBTOTAL*	PAGE TOTAL
SPECIALIST & CONSULTS	311525	138025	53725	156275	132950	342950	792500
LOCAL SUPPORT							
Local Employees	NA	NA	NA	NA	NA	0	0
Local Consultants	NA	NA	NA	NA	NA	0	0
Office Operations	NA	NA	NA	NA	NA	0	0
Research Supl/Equip	NA	NA	NA	NA	NA	0	0
Household Furniture	NA	NA	NA	NA	NA	0	0
Vehicle Operation	NA	NA	NA	NA	NA	0	0
In-Country Travel	NA	NA	NA	NA	NA	0	0
Internal Evaluation	NA	NA	NA	NA	NA	0	0
Rents and Utilities	NA	NA	NA	NA	NA	0	0
Miscellaneous	NA	NA	NA	NA	NA	0	0
OVERSEAS TRAINING							
Ph.D Study USA	0	14000	11300	10000	0	21300	35300
Ph.D Study TWC	5000	0	0	0	0	0	5000
M.S. Study USA	0	0	10700	0	11400	22100	22100
M.S. Study TWC	4700	9400	4700	4700	0	9400	23500
Up to 6 Mo.USA	0	15000	32000	3850	0	35850	50850
Up to 6 Mo.TWC	6750	19650	3200	0	25000	28200	54600
Int'l Conferences	26100	11000	7000	0	0	7000	44100
Staff Travel	6600	16500	0	6150	3750	9900	33000
IN-COUNTRY TRAINING							
Short Term Courses	4000	78000	0	16500	28000	44500	126500
Discussion/Seminars	3000	2000	0	0	0	0	5000
Sabbatical Studies	1150	1150	575	1375	1150	3100	5400
Scholarships	0	650	3660	1200	1090	5950	6600
CONTRACT RESEARCH	5175	59000	20000	12000	46000	78000	142175
EVALUATION	0	0	0	0	0	0	0
COMMODITIES/CONSTRUCT							
COMMODITIES	97000	17900	92500	61500	68000	222000	336900
CONSTRUCTION	0	0	0	0	0	0	0
CONTINGENCIES	0	0	0	0	0	0	0
PROGRAM AREA TOTALS	471000	382275	239360	273550	317340	830250	1683525
PERCENT OF BUDGET BY PROGRAM AREAS	7.82	6.35	3.98	4.54	5.27	13.79	27.97

AGRICULTURAL RESEARCH PROJECT PHASE II
ANNUAL FINANCIAL PLAN 1 JULY 1984 - 30 JUNE 1985
SUMMARY OF PROGRAM AREA BUDGETS / IN US DOLLARS

Table 4

BUDGET CATEGORIES	VI	VII	VIII	IX	*	SUMMARY OF PAGES 1,2,& 3		PERCENT OF TOTAL BY BUDGET CATEGORY
	LIVE- STOCK & FISHERY	SOIL MGMT	IRRIG WATER MGMT	FEST MGMT	*	PAGE TOTAL	GRAND TOTAL	
1. SPECIALIST & CONSULTS	69000	149325	380125	192950		791400	2065725	0.34
2. LOCAL SUPPORT								
Local Employees	NA	NA	0	NA		0	109000	1.3
Local Consultants	NA	NA	32500	NA		32500	32500	0.54
Office Operations	NA	NA	0	NA		0	102000	1.68
Research Suppl/Equip	NA	NA	0	NA		0	13000	0.20
Household Furniture	NA	NA	0	NA		0	4000	0.07
Vehicle Operation	NA	NA	0	NA		0	52000	0.85
In-Country Travel	NA	NA	0	NA		0	24000	0.40
Internal Evaluation	NA	NA	5000	NA		5000	5000	0.08
Rents and Utilities	NA	NA	0	NA		0	3500	0.14
Miscellaneous	NA	NA	0	NA		0	42000	0.72
SUB-TOTAL							395000	6.56
3. OVERSEAS TRAINING								
Ph.D Study USA	0	0	12500	0		12500	47800	0.79
Ph.D Study TWC	5000	5000	0	0		10000	15000	0.25
M.S. Study USA	0	22400	0	15000		37400	71100	1.18
M.S. Study TWC	0	0	48300	4700		53000	77500	1.29
Up to 6 Mo.USA	11000	53500	41750	31200		137450	229200	3.81
Up to 6 Mo.TWC	0	121000	20700	22600		164300	223200	3.71
Int'l Conferences	10500	24750	11000	5400		51650	115300	1.93
Staff Travel	7000	19000	18000	36000		78000	133500	2.22
SUB-TOTAL							912600	15.16
4. IN-COUNTRY TRAINING								
Short Term Courses	37800	16000	225000	44100		324900	631600	10.49
Discussion/Seminars	14100	33400	7500	27500		82500	37500	1.49
Sabbatical Studies	575	1150	1725	0		3450	9425	0.16
Scholarships	975	1100	960	1650		4685	12775	0.21
SUB-TOTAL							741300	12.31
5. CONTRACT RESEARCH	10000	12000	228700	43500		294200	433375	7.25
6. EVALUATION	0	0	0	0		0	15000	0.25
7. COMMODITIES/CONSTRUCT								
COMMODITIES	30000	69330	263000	66100		448430	1135090	18.86
CONSTRUCTION	0	0	0	0		0	69000	1.15
8. CONTINGENCIES	0	0	0	0		0	250000	4.15
PROGRAM AREA TOTALS	195950	529955	1295760	510700		2532365	6020090	
PERCENT OF BUDGET BY PROGRAM AREAS	3.25	8.80	21.52	8.49		42.07	100.00	100.00

TRAINING AND HUMAN RESOURCE DEVELOPMENT

A total of \$1,453,700 is planned by the various program areas to be used in human resource development of scientists and technicians. This amount is distributed among the program areas as follows:

	TRAINING		
	In country,	Overseas	Total
1. RESEARCH MANAGEMENT	173,175	72,250	245,425
2. MAINTENANCE	3,400	3,000	6,400
3. TRAINING	1,470	0	1,470
4. AGRICULTURAL INFORMATION	4,200	23,800	27,000
5. FARMING SYSTEMS	0,150	47,150	57,300
6. ECONOMICS & SOCIAL SCIENCE	01,000	05,500	167,350
7. CROPS	17,075	24,700	41,775
8. AGRONOMY	4,235	40,700	73,135
9. HORTICULTURE	30,240	40,150	70,390
10. LIVESTOCK & FISHERIES	53,450	33,500	86,950
11. SOILS	53,450	245,450	297,300
12. IRRIGATION WATER MANAGEMENT	235,105	151,250	386,435
13. PEST MANAGEMENT	73,250	114,700	187,950
TOTAL OF TRAINING \$741,300 \$712,400 \$1,453,700			

More detailed information regarding these proposed expenditures may be found in the following sections.

RESEARCH SYSTEM MANAGEMENT

4. In-Country Training

\$173,175

** Short-Term Courses

\$172,600

- * A 3-month training course will be held, with assistance from Michigan State University, on use and maintenance of microcomputers. About forty participants are anticipated. \$25,000
- * The International Service for International Agricultural Research (ISNAR), in cooperation with BARC and IADS, will conduct two training workshops in research management. The first, scheduled for October 1-3, is Regional Workshop on Research Program Evaluation. About 50 participants are expected. \$25,000
- * An OICD/USDA course on Management Planning and Evaluating Research Organizations will be held for 25 persons in December 1984. \$44,000
- * An OICD/USDA course on Technology Diffusion will be held for 25 persons in January 1985. \$44,000
- * A 3-days course on financial management of development projects will be conducted by ISNAR for 40 persons in the fourth quarter. \$20,000
- * A course on dynamics of management will be conducted for 4 weeks for 10 people by AIM in the fourth quarter. \$14,600

♦♦ Sabbatical Studies

\$ 575

A sabbatic study in research management will be provided for one staff member of BAU management development center to study research project administration. Duration twelve months. Person-months 1984-1985 6.0.

\$ -0-

MAINTENANCE

4. In-Country Training

\$ 3,400

** Short-Term Courses

\$ 3,400

- * A 10-days course on shop stores and maintenance, records and spare parts will be held at BARI in the 3rd quarter, with 14 participants. Maintenance Specialist will be the lecturer/demonstrator. \$ 1,000

- * Two 14-day courses on maintenance of motorized equipment will be held at BARI on in the third quarter, and the second in the fourth quarter. Twenty participants for each course. Maintenance Specialist will be the lecturer/demonstrator. \$ 2,400

TRAINING

4. Incountry Training

\$ 1490

** Scholarships:

\$1490

- * One on-going PhD at BAU
(Feb/84-Feb/88). Person
Months in 1984-85 6.0 \$ 610
- * One intended PhD at BAU
expected period of study
in Feb/85-Feb/89. Person
Months in 1984-85 6.0 \$ 400
- * Two intended MS at BAU
expected period of study
in MAY/85-Oct/86. Person
Months for 1984-85 12.0 \$ 480

Note: Six months scholar-
ship fund is paid at
the commencement of
a Bangladesh degree
and following every
six months afterwards.

AGRICULTURAL INFORMATION

4. In-Country Training \$4200

** Short-Term Courses \$4200

- * A series of 15 one-day workshops will be held at agricultural research facilities to improve the communication skills of researchers in the presentation of scientific information. A communication training expert will be employed to organize and conduct these workshops in the third and/or fourth quarter. \$1800

- * A one-week workshop will be held in January to improve the skills of about 40 personnel concerned with libraries of the agricultural research system; training to be organized and conducted by NALBDC. \$1200

- * A one-week workshop will be held in the fourth quarter to improve the quality of Bangladesh agricultural science journals by improving the editorial and management skills of those responsible for the publications. An editor manager of an agricultural journal from another country will be employed to organize and conduct this workshop. \$1200

FARMING SYSTEM

4. In-country Training

\$ 8,150

** Short-Term Courses

\$ 4,000

* Cropping Systems Research Methodology.

This training course will be organized with the collaboration of BRRI, BARI and BARC with Bangladeshi trainees. The participants will be scientists to be appointed as site coordinators. Twenty to twenty-five participants are expected. Two courses will be offered, one during the summer season and another in the winter. Person-months in 1984-1985 1.0.

\$ 4,000

** Discussions/Seminars

\$ 2,000

* At least one field day each crop season will be organized in the cropping systems/farming systems sites of the institute participating in the cropping systems program and multilocation testing sites. These field days will be organized by the principal investigators and site coordinators during the month of August (for early kharif season), November (for late kharif season), and February (for rabi season). These field days will be for the extension personnel and the farmers of the project area (twenty to thirty participants). The objectives of the field days are (1) to inform the extensionist about the suitable technology to be transferred to other farmers and (2) to acquaint farmers in the project area with technology under evaluation.

* One workshop will be organized in each participating institute. The participants in these workshops will be the research and extension personnel of the different institutions. The objectives are (1) to discuss the results of the last year's activities with emphasis in the identification of suitable technology to be transferred, and (2) to discuss and get feed-back information for future research activities. The principal investigators and coordinator of the NCSP will be responsible for the planning and organization of the workshop the institutes will determine the appropriate dates.

* Training sessions for farmers will be organized at the experimental stations and institutional headquarters at least a year. The objectives are (1) to familiarize the farmers with the proven technology at the cropping systems sites, and (2) to show to the farmers the field experiments and discuss about the performance of improved practices and benefits of agronomic practices like fertilizer application, planting dates, land preparation, and pest control. The training of farmers will be organized by the site coordinator and his associated staff. Planned months for holding the training are February and June.

* Training courses (2-3 days) for extensionists will be organized by the principal investigators and site coordinators this year. The objectives are (1) to inform the extension personnel about the technology under

evaluation in the cropping systems and multilocation testing sites; (2) to identify the technology suitable to be transferred to other rural areas; (3) to show to the participants the crops and production technology at the experimental stations; and (4) to get feed back from the extensionists about research needs for the rural areas.

- * Each site coordinator will organize a seminar at the regional station or institute headquarters to present the results of last year's research at the respective sites. The principal investigators and coordinators of the program will attend these seminars whenever possible. The site coordinators will inform BARC and the principal investigators about the dates of the seminars are scheduled. Planned dates February-March.
- * NCS program coordinator will organize monitoring tours for the principal investigators to visit the cropping systems, farming systems and multilocation testing sites. The principal investigators will elaborate schedules for the site coordinators, agronomists and economists to visit some of the other sites in the country. These tours must be organized in early February for the winter season and November for the late kharif season.
- * Farmers participating in the cropping systems and farming systems problems will be familiarized with the technology under testing

on evaluation in each site. The site coordinators will organize discussion sessions with small groups of farmers of the project area, to review the performance of the crops and crop technology. Each field assistant in the sites will be responsible to organize small groups will be organized at least twice in each season.

**** Sabbatical Studies**

\$ 1,150

- * One irrigation agronomist will participate in collaborative research with the water management program to study the crop productivity and/or overall farm productivity in relation to water management efficiency systems and/or farming systems research site. The Crops Division of BARC will establish the contacts with Universities or institutions to get the services of the scientists for this sabbatical.
- * One soil scientist will perform detailed soil surveys of these cropping systems/farming systems research project areas. The scientist will prepare soil maps of the project areas containing information about soil series and their chemical and physical properties. The Soil Fertility Division of BARI will elaborate in these studies.

**** Scholarships**

\$ -0-

AGRICULTURAL ECONOMICS AND SOCIAL SCIENCE

4. In-Country Training

\$ 81,800

** Short-Term Courses

\$78,000

- * "Analysis of Economic Research Data" course. 25 participants. 4 courses of 10 days total duration. \$ 1,000
- * 4-weeks course on "Multiple Regression Analysis". March-April. 10 participants. \$11,500
- * 4-weeks course on "Elementary Parametric Statistics, March. 20 participants. \$ 8,000
- * 3-weeks on "Applied Matrix Algebra" with 25 participants. \$ 3,000
- * 2-weeks course on "Elementary Price Analysis". October. by the Specialist. 20 participants. \$ 1,000
- * 3-weeks course on "Economic Analysis of Cropping Systems Research Data". 20 participants. \$10,000
- * 2-week course on Economics of livestock production in collaboration with Livestock \$ 2,500
- * 4-weeks course on "Agricultural Project Analysis". 20 participants. \$15,000
- * 2-weeks course on "Applied Cartography". 15 participants. \$ 1,000
- * 4-weeks course on "Application of Statistics in Agricultural Research" September. 30 participants. \$25,000
- * 2-weeks course on "Application of Micro-computers for Social Science Research" Second quarter; under Research Systems Management. \$ -0-

** Discussion Seminars	\$ 2,000
<ul style="list-style-type: none"> * Workshop on "Partial Budgeting in Agricultural Research". Dates -----, Participants -----. 	\$ NONE
<ul style="list-style-type: none"> * Series of workshops on methods of analyzing socio-economic data from cropping systems research areas. Duration of two weeks with 20 participants. 	\$ 2,000
** Sabbatic Studies	\$ 1,150
<ul style="list-style-type: none"> * Study of "Socio-Economic Impact of Flood" to be undertaken by Bangladesh Academy for Rural Development in Comilla. 	\$ 500
<ul style="list-style-type: none"> * Six persons from research institutions or universities will be offered sabbatic leaves for 6-months duration. Expected to begin June 1985. Person-months in 1984-1985: 0.0. 	\$ NONE
** Scholarships	\$ 650
<ul style="list-style-type: none"> * One MS Scholarship at BAU for period of February 1984-July 1985. Person-months in 1984-1985: 12.0. 	\$ 400
<ul style="list-style-type: none"> * One MS scholarship for study at BAU. Person-months in 1984-1985: 6.0. 	\$ 250

CROPS

4. In-Country Training

\$ 19,075

** Short-Term Courses

\$ 16,500

- * Two short term courses in breeding methodology in self and cross-pollinated crops (2-3rd quarter) for SO/SSO level scientists. Two weeks with 20 participants each.

\$ 4,000

- * Four short term courses on pulses, oilseeds, maize and tuber crops, respectively for Subject Matter Specialists of Extension Department (2 & 3rd quarter). Two weeks with twenty participants each.

\$ 10,000

- * Three three-day workshops on spices, oilseeds and root and tuber crops improvement (3rd quarter).

\$ 2,500

** Sabbatical Studies

\$ 1,325

- * Two in plant breeding, one at BAU and one at BARI. Beginning 2nd and 3rd quarter (12 person-months 1984-85).

** Scholarships

\$ 1,200

Five MS degree students are expected to begin March 1985-August 1986. Person-months in 1984-1985 $5 \times 6 = 30.0$.

AGRONOMY

4. In-Country Training:

\$4235

** Short course on statistical training and research techniques, jointly with Soil Science and Ag. Economics (Funding via Ag. Economics) NONE

** Sabbatical Studies \$575

* One in Agronomy (Feb/84-Mar/85). Person Months in 1984-85 6.0

** Scholarships \$3660

* One PhD at BAU (Feb/84-Feb/88). Person Months in 1984/85 12.0 \$610

* Four PhD at BAU expected Feb/85-Feb/89 (acceptance in process). Person Months in 1984/85 \$1850

* One MS student at BAU (Nov/83-May/85). Person Months in 1984/85 11.0 \$ 240

* Four MS students expected for May/85-Oct/86. (Application in process) \$ 960

HORTICULTURE

4. In-Country Training \$ 29,630

** Short-Term Courses \$ 28,000

* Three-month course in
"Applied Horticulture"
to begin January-
February for 30 subject
matter specialists.
Person-months in 1984/85
3.0 \$ 25,000

* Training course of three
weeks for about 25 local
scientists on handling and
preparation of plant
material, laboratory
techniques, etc. planned
for third quarter. Specialist
will be principal lecturer. \$ 3,000

** Sabbatical Studies \$ 1150

* One fruit specialist and
one vegetable specialist,
each for a 6-months sabbatical
at BARI, Joydebpur. Subjects
to be based on priority
research needs. Person-months
in 1984/85 $2 \times 6 = 12.0$

** Scholarships \$ 1090

* One PhD scholarship in
Horticulture, at BAU.
Studies expected period
of study in Feb/85-Feb/89
Person-months 1984/85
6.0 \$ 370

* Three MSc scholarships
in Horticulture at BAU.
Studies expected period
of study in Feb/85-
Aug/86. Person-months in
1984/85 $3 \times 6 = 18.0$ \$ 720

LIVESTOCK RESEARCH

4. In-Country Training \$47,950

** Short-Term Courses \$33,800

- * Two 2-week courses:
Cattle/Buffalo Production
in March. Feed and Fodder
Production in April. 20
participants in each
course including BAU, DLS
personnel, field assistant
and farmers.

Note:

- * Two Animal scientists
from TWC for conducting
workshop on cattle/
Buffalo production and
feed and fodder production
and utilization in March
and April. Person Months 2.0 \$31,300

- * One 2-week course on poultry
production and management.
20 participants (Farm Manager)
of DLS, BAU, BADC, July 84 \$2,500

** Discussions/Seminars/Workshop \$12,600

- * 2 weeks workshop on research
methodology in livestock and
poultry, 20 participants.
March 85.

Note:

- * One Animal Scientist from USA
and one Animal Scientists
from TWC for conducting
workshop on research metho-
dology in livestock and poultry
in March. Person Months 1.0 \$11,000

* 2 days workshop of commercial poultry farm managers, 40 participants, May 85	\$800
** Sabbatical Studies	\$575
* One on-going study at Dept. Marine Biology, Chittagong University for six months - to be selected begin in 1985/86	
** Scholarships	\$975
* Two PhD for study at BAU (Feb/85-Feb/89 expected). Person-months in 1984-85 $2 \times 6 = 12.0$	\$735
* One MSc for study at BAU (Mar/85-July/86). Person-months in 1984-85 6.0	\$240
* Four in-country MSc scholarships will be provided to livestock scientists for higher studies in Animal and Poultry Science at BAU. The candidate will be selected during this period and the course be started in 1985/86.	NONE

FISHERIES (LIVESTOCK PROGRAM AREA)

3. In Country Training \$5,500

 * Short Term Courses

 One 2 week course on
 Freshwater Aquaculture
 in the 3rd quarter.
 25 participants. \$ 4,000

 One 2 day workshop on
 Brackishwater Fisheries
 Research in the 4th
 quarter. 20 participants. \$ 1,500

SOIL MANAGEMENT

4. In-Country Training:

\$ 53,650

** Short-Term Courses

\$ 18,000

- * One 3-week laboratory technicians training course at BARI, November 1984. 16 laboratory specialist participants from various institutes. \$ 3,000

- * One 1-week course on biological nitrogen fixation for 40 research/extension personnel from various institutes. February-March 1985, BAU. \$ 5,000

- * One 3-week course on fertilizer research for 36 soil fertility field research personnel from various institutes. October 1985, BJRI/BARI/BARC. \$ 8,000

- * Two 1-week courses on instrumentation for 16 (each course) laboratory heads from various institutes. March 1985, BARI. \$ 2,000

** Workshop/Seminar

\$ 33,400

- * One 2-3 day workshop on data report writing, and paper presentation at seminars for 100 soil scientists from various institutes, January 1985, BARC. \$ 4,000

- * Six 1-day workshops on plant and soil sampling techniques for 250 total research/extension personnel, October 1984-April 1985, BARI sub-stations and other institutes. \$ 2,100

- * Four 2-day workshops on use of fertilizer recommendation guide for total of 100 research/extension personnel, November 1984-June 1985, BARI sub-stations or other convenient institutes. \$ 1,800

- * One 1-week workshop on general soil fertility in Bangladesh for 60 research/extension personnel from various institutes. January-February 1985, BARC. \$ 5,500
- * About 20 seminars given by visiting consultants at various institutes to a total audience of about 500-600 persons. \$ NONE
- * A one-week international workshop on minimum tillage is in the planning stages. No dates can be fixed at this time. \$20,000
- ** Sabbatical Studies \$ 1,150
- * One on-going in Soil Fertility and Microbiology. \$ 575
- * Possibility of one person for 6-9 months to work at the BARI model laboratory on analytical procedures. \$ 575
- ** Scholarships \$ 1,100
- * One on-going MSc at BAU studying Soil Microbiology (June 1983-December 1984). Person-months in 1984-1985 6.0. \$ 240
- * One on-going MSc at BAU studying Soil Physics (May 1983-November 1985) 6.0. \$ 240
- * Two possible candidates to study at DU or BAU one in the area of soil fertility at PhD level and the other at MS or PhD level in the area of soil and water management. Both should initiate work from January 1985 to 1988 and 1988 respectively. Person-months in 1984-1985 $2 \times 6.0 = 12.0$. \$ 660

WATER MANAGEMENT:

PROJECT SUPPORT THROUGH SOILS AND IRRIGATION DIVISION

4. In-Country Training

\$109,815

** Short-Term Training

\$104,500

- * January 1985. Four-week USDA course "On-farm Water Management" for 20-25 Agricultural Training Institute personnel. To be taught by a team of three expatriates. \$35,000

- * February 1985. Three-weeks analysis of farm irrigation systems by BARC/BARI/BAU Diagnostic Analysis team with 20-25 participants. \$ 3,000

- * June 1985. Four week course on "Techniques for Use of Remote Sensing in Agricultural Research" for 20-25 BSc and MSc personnel in the agricultural research system. \$40,000

- * Cooperative programs with Department of Agricultural Extension to include, as appropriate, assistance in developing a textbook in IWM for the ATIs; review of ATI's IWM curriculum; development of an experimental intensive farmer level training program in a selected upazila; preparing and funding course for the ten soon-to-be-appointed subject matter specialists in IWM. \$26,500

** Discussions/Seminars

\$ 4,500

- * July 8-9, 1984. Workshop on "Improved Distribution Systems for Minor Irrigation." 75-100 participants. \$ 1,500
- * June 1985. Two-days workshop on "Methodologies to Evaluate the Performance of Irrigation Systems." 75-100 participants expected. \$ 1,500

* October 1984-June 1985. Monthly seminar at BARC on irrigation water management issues. Participation of agricultural scientific community. 20-40 participants expected monthly. \$ 1,500

** Sabbaticals \$ 575

* Study of soil irrigation parameters in Jamalpur area (Jan/85-Dec/85). Person-months in 1984-85 : 6.0

** Scholarships \$ 240

* One trainee to pursue MSc degree in Bangladesh in irrigation water management at SAU or BUET. Person months in 1984-85 : 6.0

TOTAL: \$708,040
=====

WATER MANAGEMENT:

PROJECT SUPPORT THROUGH AGRICULTURAL ENGINEERING DIVISION

4. In-Country Training \$ 75,815

** Short-Term Training \$75,000

- * October 1984-June 1985. Five-day course to be repeated four times "Pump Irrigation in Bangladesh": multi-disciplinary attendance intended; twenty participants per session. Venue: to be rotated among agricultural institutes in the country. \$12,000

- * April 1985. Four-weeks course on "Pumps and Motors Technology" for twenty to twenty-five agricultural, irrigation, and/or mechanical engineers at BSc and MSc levels. To be taught by team of three expatriates. \$35,000

- * May 1985. Four-week course on "Groundwater" for 20-25 agricultural/irrigation/civil engineers. To be taught by team of expatriates. \$28,000

** Sabbaticals \$ 575

- * In-depth study of technical performance of shallow tube-wells in Comilla area (Jan/85-Dec/85). Person-months in 1984-85: 6.0

** Scholarships \$ 240

- * One trainee to pursue MSc degree in Bangladesh at BAU or BUET in agricultural engineering (pumps). Person-months in 1984-85: 6.0

WATER MANAGEMENT:

PROJECT SUPPORT THROUGH ECONOMICS AND SOCIAL SCIENCES DIVISION

4. In-Country Training	\$ 44,480
** Short-term Courses	\$42,500
* June 1985. Two day course on "Use of Remote Sensing in Agricultural Research" for 30-35 senior research and Ministry of Agriculture administrators.	\$5,000
* Date to be determined. A 4-week course on the "Water Production Function" to be taught in 1985 by a team of consultants from USU. 20-25 participants expected.	\$35,000
* Date to be determined. A 2 week course on "Economics of Irrigation" to be held at BARD Comilla. 20-25 participants expected.	\$2,500
** Discussions/Seminars	\$1,500
* April 1985. Two-day workshop on "Electrification of Irrigation Equipment." 75-100 participants expected.	\$1,500
** Scholarships	480
* Two trainees to pursue MSc degrees in the economics of irrigation at local universities. Person-months in 1984-85: (2x6=) 12.0	
	TOTAL: \$205,280
	=====

WATER MANAGEMENT:

PROJECT SUPPORT THROUGH THE CROPS DIVISION

3. In-Country Training

\$ 5,075

** Short-Term Courses

\$3,000

- * April 1985. Three-weeks course on "Improvement of Indigenous Low-Cost Irrigation Appliances"; 25-30 participants. To be taught by team that may include staff of local NGOs.

** Discussions/Seminars

\$1,500

- * February 1985. Two-day workshop on "Promotion of Dry-Field Irrigated Crops." Seventy to 100 participants expected.

** Sabbaticals

\$ 575

- * Study yield productivity in relation to water management efficiency in Jamalpur area (Jan/85-Dec/85). Person-months in 1984-85: 6.0

PEST MANAGEMENT

4. In-Country Training

\$73,250

** Short-Term Courses

\$44,100

- * There will be a 1 week course in January or June 1985 at BARI or RARS Ishurdi for 25 Entomologists from Research Institutes and Regional Stations on experimental design and analysis of field and laboratory experiments. An expatriate consultant will provide the training expertise.

\$5,100

- * Two training courses of 1 week duration, on plant disease diagnosis, to be held in January 1985 for researchers and senior extension officers. Training will be done by an expatriate consultant.

\$12,000

- * A 2 week training course on IPM principles will be held in January-February 1985 at BARI for 30 crop protection research scientists. CIOF will assist in organizing, staffing and training.

\$27,000

** Discussion/Seminars

\$27,500

- * A 1-day training course in Vertebrate Pest Management will be held at BARI in March to May 1985 for about 60 SMS in the Plant protection Directorate of the DAE.

\$2,500

- * A total of 20-25 1-day field training programs will be held at BARI Regional and Sub-Regional stations on control assessment of damage by vertebrate pests. VPS staff will provide training.

\$10,000

- * A 4-day regional discussion group in vertebrate pest management in south and S.E. Asia will be held in April/May 1985 in Dhaka or Joydebpur. Some 10 persons will be brought from India, Pakistan, Nepal, Sri Lanka, Burma, Thailand and Malaysia to join Bangladeshi scientists. \$15,000
- ** Sabbatical Studies \$ NONE
- ** Scholarship \$ 1,850
- * Md. Nasiruddin, SSO, BARI, selected but not yet admitted to BAU for PhD in Entomology. \$ 400
- * A.K.M. Quadrat-E-khuda, selected but not yet admitted for PhD in Entomology. \$ 400
- * Zabunessa, SO, BARI, admitted to BAU in 1983 for MSc in Entomology. Completion date in 1986. (on-going) \$ 200
- * Myeenuddin Ahmed, Asstt. Prof., BAU awarded but not yet admitted for PhD in Plant Pathology. \$ 240
- * Mahbub Uddin Ahmed, SO, BARI awarded but not yet admitted at BAU for MSc in Plant Pathology. \$ 400

RESEARCH SYSTEM MANAGEMENT

3. Overseas Training

\$ 72,250

- ** PhD in USA \$ -0-
- ** MS in USA \$ 11,600
- * Candidate from Ministry of Agriculture in Research Systems Management, September 1985- September 1989, NONE. \$ -0-
- * One in farm operations, Planned September 1985-March 1988, Person-months 1984-85 NONE. \$ -0-
- * One in Agricultural Information/Communication Planned September 1985-March 1988 Person Months 1984-85 0.0 NONE
- * One in Human Resource Development Training Planned September 1985-March 1988, Person Months 1984-85 0.0 NONE
- * One in Research Systems Management August 1983- February 1986, Person-months 1984-1985 12.0 \$ 11,600
- ** Up to 6 months in USA \$ 27,600
- * Two persons will attend the Arthur D. Little Course in Human Resources Management at Cambridge, Massachusetts, in April. If possible, they will also attend a management communication course at Lansing, Michigan. Person-months 1984-1985 4.0. \$ 6,800
- * One person will be sent for a 12-months training program in management in the USDA program in Washington, D.C. Date of initiation August; Person-months in 1984-85 10.0. \$20,400

** Up to 6 months in TWC.
Committed Costs of 1983-1984
yet to be recorded. \$ 1,300

** International Conferences \$ 12,150

Additional needs are anticipated for Bangladeshi participation in international conferences, such as at the international agricultural research centers. Resources are needed to meet priority cases.

** Staff Travel \$ 20,000

Funds will be needed to support international staff travel that is consistent with project objectives, but which cannot be specified at this time.

MAINTENANCE

3. Overseas Training

\$ 3,000

** Up to 6 months in TUC

- * One person from BARI for training in laboratory equipment operation, maintenance and repair-possibly at AIT-starting at beginning of the 3rd quarter. Person-months 6.0.
-

TRAINING

3. Overseas Training

NONE

•• Upto six months training in USA

* Eight weeks training for two people from the Training Unit at Arthur D. Little Course at Cambridge Mass in April, 1985. Funded under Research Systems Management.

AGRICULTURAL INFORMATION

3. Overseas Training

\$29,600

** Up to six months - USA

\$19,700

- * Training in the USA in communication skills and management for two persons designated for library posts in the national agricultural research system; training programs to be developed by Cornell University. Person Months 1984-85 6.0

\$10,200

- * Training in the USA in a USDA course on "Communication Skills for Professionals" on December 26, 1984-January 6, 1985 for an official designated by the Secretary, Agriculture and Forests.

\$ 3500

** International Conferences

\$7400

- * Additional needs are anticipated for Bangladesh participation in international conferences on agricultural information and on library sciences, but for which descriptions, dates and sites are not yet available in the country.

** Staff Travel

\$ 2500

- * Funds will be needed to support international staff travel requested by the Chairman for senior research managers to improve their understanding and use of communication in the research process, but which are not specified at this time.

FARMING SYSTEM

3. Overseas Training \$ 49,150

** PhD in USA \$ -0-

** PhD in TWC \$ 5,000

- * One at UPLB, Agronomy
(Utilization of residual
moisture after rice) May 1983-
1987 - will work in BARC in
coordination with the National
Farming Systems Research
Project. Person-months in 1984-
1985 12.0.

** MS in TWC \$ 4,700

- * One at UPLB - Agronomy, May 1983
to December 1985. Person-months
in 1984-1985 12.0.

This scientist is to be assigned
as coordinator of Cropping Systems
sites.

** 6 months training in TWC \$ 6,750

- * Three participants. "Farming
Systems Training Course" IRRI,
March-June (4.5 months) will
return to work in the Cropping
Systems sites.

** International Conferences \$ 26,100

- * Asian Farming Systems workshops
will be held in December 1984
at IRRI and January 1985, at
ICTA. Two participants from
Bangladesh, the National
Coordinated Cropping Systems
Program Coordinated Cropping
Systems Program coordinator (or
his representative), and one
principal investigator from a
participating institute.

\$ 3,200

- * Farming Systems Symposium,
Kansas, USA. Two participants
from Bangladesh: Member-
Director (Crops) and Head, On
Farm Trial Division, BARI
Date: October 1984. \$ 3,700
- * International Conference in
Farming Systems Research in
Bangladesh is planned for
the third quarter of this
year. Fifty Bangladeshi
Scientist and five
expatriates are expected to
participate for a period of
one week. \$19,200
- ** Staff Travel \$6,600
- * Two monitoring tours, one to
the Philippines and another to
Thailand, to visit the
Farming Systems Research sites
for two weeks. Three cropping
systems site coordinators will
participate in each tour.
Person-months in 1984-1985
1.0.

AGRICULTURAL ECONOMICS AND SOCIAL SCIENCE

3. Overseas Training

\$ 85,550

** PhD in USA

\$ 14,000

- * One on-going at Purdue University (January 1984 - december 1987). Person-months in 1984-1985 12.0.

\$ 14,000

- * One intended in Agricultural Economics with emphasis on development economics for September 1985-September 1989. Person months in 1984-1985. 0.0.

\$ NONE

** PhD in TWC

\$ NONE

** MSc in USA

\$ NONE

- * Two MSc in Statistics intended for September 1985-March 1988. Person-months in 1984-1985. 0.0.

\$ NONE

- * One MSc in Applied Anthropology for September 1985-March 1988. Person-months in 1984-85 0.0

\$ NONE

** MSc in TWC

\$ 9,400

- * One student at UPLB, Philippines on-going April 1983-October 1985. Person-months in 1984-1985. 12.0.

\$4,700

- * One student at UPLB, Philippines on-going March 1984-September 1986. Person-months in 1984-1985. 12.0.

\$4,700

** Up to 6 months in USA.

\$15,000

* Two persons for 3-week course on "Role of Women". November-December. Person-months $2 \times .75 = 1.5$. ---	\$7,500
* Two participants in course on "Irrigation Water Production Functions". Person-months $2 \times 1.0 = 2.0$. ----	\$7,500
** Up to 6 months in TWC.	\$19,650
* Three researchers for 2-month IRRI course "Agro-Economic Research Training (October-November)". Person-months $3 \times 2 = 6$. --	\$10,500
* Three persons in 3-weeks course at ICRISAT on "Economics of Farming Systems". Person-months $3 \times .75 = 2.25$. ----	\$ 4,800
* One person for rural development course in Turkey. Person-months 1.0. ----	\$ 2,500
* 3 participants in 8 weeks training of Agricultural Statistics at Los Banos during February, 1984 cost recorded in 1984-1985.	\$ 1,850
** International Conferences	\$11,000
* One senior staff member from BAU to annual meeting American Agricultural Economics Association. August Person-months 0.5.	\$ 4,000
* Other international conferences not specified. Two persons, each 0.5 person-month. Person-months 1.0. ----	\$ 7,400

** Staff Travel

\$16,500

- * Visits to international centers such as ICRISAT and IITA. Two persons, 0.5 person-months each. Person months 1.0. \$ 4,000

- * Tour of Indonesian cropping systems research program. December-January. Five persons for two weeks. Person months $5 \times .5 = 2.5$. \$ 6,250

- * Mid-level social scientists orientation tour to international and regional centers in Asia. Five persons for two weeks. Person-months $5 \times .5 = 2.5$. \$ 6,250

CROPS

3. Overseas Training

\$ 24,700

** PhD in USA

\$ 10,000

* One-on going at North Dakota
in Plant Breeding: Cereals
(August 1983-August 1987).
Person-months in 1984-1985
12.0.

\$ NONE

* One in Plant Breeding-Pulses
and Oilseed Planned for
September 1985-September
1989.
Person Months 1984-85 0.0

\$ NONE

** PhD in TWC

\$ NONE

** MS in USA

\$ NONE

** MS in TWC

\$ 4,700

* One on-going at CLSU,
Philippines, (May 1983-
October-1985). Person-
months in 1984-1985
12.0.

** Up to 6 months in USA

\$ 3,950

1983-1984 committed costs of
four participants in various
training courses. Cost to be
recorded in 1984-1985.

** International Conferences

\$ NONE

** Staff travel

\$ 6,150

* 3 weeks study tour for two
scientists to visit TWC
(India and Thailand) Oilseed
and Pulses Programs (1.5
person-months in second
quarter).

AGRONOMY

3. Overseas Training	\$68,700
<ul style="list-style-type: none"> ** PhD in USA \$11,300 <ul style="list-style-type: none"> * One students in Agronomy (Aug/83-Aug/87). Person Months in 1984/85 12.00 NONE * Two PhD in Agronomy expected Sep/85-Sep/89. Person Months in 1984/85 0.0 ** MS in USA \$10,700 <ul style="list-style-type: none"> * One student in Agronomy (Aug/83-Feb/86). Person Months in 1984/85 12.0 ** MSc in TWC \$4700 <ul style="list-style-type: none"> * One student in Agronomy (Mar/83-Oct/85). Person Months in 1984/85 12.0 ** Upto 5 months in USA: \$32000 <ul style="list-style-type: none"> Research/extension skills training 5 junior scientists (March-May). Person-months $5 \times 3.0 = 15$ ** Upto 5 months in TWC \$3200 <ul style="list-style-type: none"> 2 participants in Seed Technology Training at UPLB Philippines for two weeks August 12-August 31, 1984. Persons Months in 1984/85 1.0 ** International Conference: \$7000 <ul style="list-style-type: none"> Research Farm Mechanization, Ireland, 2 scientists, 3 weeks (July) Person-months $2 \times .75 = 1.50$ ** Staff Travel NONE 	

HORTICULTURE

3. Overseas Training

\$ 40,150

** PhD in USA

NONE

* One students in
Horticulture-Vegetable
Crops intended for
Sep/85-Sep/89
Person Months in
1984/85 0.0

** PhD in TWC

NONE

** MSc in USA

\$11,400

* One student in
Horticulture
(Aug/83-Feb/86)
Person Months
in 1984/85 12.0

\$11,400

* Two students in
Horticulture-Vegetable
Crops are intended for
Sep/85-Mar/88.
Person Months in
1984/85 0.0

NONE

** MSc stud. in TWC

NONE

* Two persons to be
selected from Fruits
and Vegetable Sections,
BARI for training in
Philippines, Thailand
or India; Expected for
June/85-Dec/87. Person-
months in 1984/85 0.0

** Up to 3 months TWC

\$ 25,000

* Six scientists for
5-month program in
Thailand on "Integrated
Regional Training Course
in Advanced Vegetable
Production" October-
February. Person-months
3 x 5.0 = 30.0

** International Conference

NONE

** Staff Travel

\$ 7750

* Study tours for PSOs
Vegetable and Fruits
Section, and Head,
Division of Horticulture,
BARC. Person-months
 $3 \times 1.0 = 3.0$

LIVESTOCK RESEARCH

3. Overseas Training

130,000

** PhD and MSc in USA

NONE

** PhD in TWC

\$5000

* One student in animal science attending UPLP, Philippines (May/83-May/87). Person Months in 1984-85 12.0

** MSc in TWC

NONE

** Up to Six Months in USA

\$11,000

* Short-course on "Management of Agricultural Research Facilities and Organization in Washington, D.C. USDA for two people. July-September 1984. Person Month in 1984/85 3.0

** Up to Six Months in TWC

NONE

** International Conferences

\$7000

* Provision for three principal investigators of projects and administrators to attend international scientific meetings in their respective fields. Each would spend about week at conference, plus travel time.
Person-months $3 \times .25 = .75$

** Staff Travel

\$7000

* Five persons (listed under "Planned Activities" 3) to review livestock research in 5 TWCs in January. Person-months $5 \times .75 = 3.75$

FISHERIES (LIVESTOCK PROGRAM AREA)

2. Overseas Training

63,500

One senior staff member of
DAU/DOR/DARC will attend
an international conference/
seminar in the 3rd quarter
for two weeks in TUC.

SOIL MANAGEMENT

3. Overseas Training

\$245,3

** PhD in USA

\$ NONE

** PhD in TWC

\$ 5,000

* One on-going in Philippines at UPLB. (May 1985-August 1987). Person-months in 1984-1985 12.0.

** MS in USA

\$ 22,400

* One on-going at Colorado State University in soil-irrigation area. (August 1985-February 1986). Person-months in 1984-1985 12.0.

\$11,500

* One on-going at Fresno State September 1984-June 1986. Person-months in 1984-1985 9.0.

\$10,500

* One person to study minimum tillage techniques (doing research in Bangladesh if possible), possibly at University of Kentucky, or University of Florida. Person should be from BARI. Needed to carry on intensive research using minimum tillage techniques with crops researched by BARI. Starting date expected September 1985-March 1988 as soon as possible. Person-months 1984-85 0.0.

** MS in TWC

\$ NONE

* One person to study soil microbiology. Person should be from DU, BARI, BRRI, BAU or INA.

Further details will be available with consultants (Dr. Deck) report in September 1984. Expected dates June 1985-December 1987. Person-months in 1984-1985 0.0. \$ None

** Up to 6 months USA. \$53,500

- * Two persons for six months each to receive intensive upgrading at two US universities. Work could count towards local degree requirements. One person to be trained in maximum yield concepts including research techniques, statistics, agronomy and economic interpretations. Possibly at University of Florida, or University of Illinois. The other person should receive training in minimum tillage practices, water management, and soil conservation. Possibly at University of Kentucky, or North Carolina State University, plus on-job SCS training.

Both candidates should be located in the US for spring semester. Person-months in 1984-1985 (2 x 6) = 12.0. \$24,500

- * One two months training - observation tour for 4 persons in US to study soil fertility aspects; mainly, service laboratory operation analytical procedures, and maintenance, systems used for sample handling and recommendation preparation, research - laboratory - extension linkages, and technology transfer systems. Possible visits to University of

Georgia, ASI, PPI, University of Florida, North Carolina State University and Cornell University. Should be initiated as early as possible. Person-months 4 x 2.0 = 8.0.

\$29,000

** Up to 6 months TWC

\$121,000

* One three month training - observation tour for four people in minimum tillage research in USA, ITTA and ICRI SAT. Should be initiated in November-December 1984. Person-months 4 x 3.0 = 12.0. \$37,000

* One two-month course on problem soil management for 10 people at AIT (Bangkok). Course should start in October 1984. Person-months 10 x 2.0 = 20.0. \$60,000

* Two persons, three months at BNF resource center, Bangkok for internship to strengthen local capabilities, starting December 1984. Person-months 2 x 3.0 = 6.0. \$11,000

* One 1 month course on instrumentation functions, utilization, maintenance and repair for 5 people at AIT (Bangkok). Dates not set. Person-months 5 x 1.0 = 5.0. Funded under Equipment Maintenance. \$ NONE

- * Each year training opportunities arise that could not be foreseen at planning time. Funds for 4 such events are needed. One such example is an IBSNAT workshop to be held in December in Venezuela. Such a trip should anticipate additional stops at old benchmark soil research sites, and at one or two US universities involved in the program. \$10,000
- * 1983-1984 committed costs for three participants training in Bangkok to be recorded in 1984-1985. \$ 3,000
- ** International Conferences \$ 24,750
 - * Plans for 10 persons to attend international conferences in the soils area.
- ** Staff Travel \$ 19,000
 - * Plans for 4 persons for five weeks to travel to various functions; such as regional network meetings, new concept seminars, and to participate as committee members for institutes/organizations.

WATER MANAGEMENT:

PROJECT SUPPORT THROUGH SOILS AND IRRIGATION DIVISION

3. Overseas Training

\$ 78,750

** PhD Study in USA -

\$12,500

- * One on-going PhD at Colorado State (Aug/83- Aug/87).
Person-months in 1984-85: 12.0 *12,500

- * One trainee to pursue graduate work in irrigation engineering. Expected dates: Sep/85-Sep/89. Person-months: 0.0

-0-

** PhD Study in TWC

-0-

** MSc Study in USA

-0-

- * One person to pursue work in water management extension. Expected dates: Sep/85-Mar/86
Person-months in 1984-85: 0.0

** MSc in TWC

\$49,300

- * Three on-going MSc at AIT, Thailand (Jan/84-Jul/85).
Person-months in 1984-85: 36.0 \$14,000

- * Two on-going MSc at UPLB Philippines (Nov/85-May/86).
Person-months in 1984-85: 24.0 \$10,400

- * Two on-going MSc at UPLB (Jun/84-Dec/85). Person months in 1984-85: 24.0 \$ 9,400

- * Three on-going MSc at CI 80 (Jun/84-Dec/85). Person months in 1984-85: 36.0 \$15,500

** Up to six Months in USA

\$15,750

- * Three participants in short-term courses such as "Soils and Water Conservation and Management" at USU. Courses to be identified.

** Up to Six Months in TWC \$ 5,000

* Two participants in courses such as "On-farm Water Management at AIT. Courses to be identified. \$ 5,000

* June 1985. Ten trainees for 8 weeks to participate in course on "Irrigation Water Management" to be held at the Indian Agricultural Research Institute in New Delhi, India. Estimated earmarked funds of \$38,500 are expected to be expended in 1985-86. Budget in 1984-85: 0.0 -0-

** International Conferences 111,000

+ Three participants for 2 weeks
Dr. L.R.Khan will attend a conference on "Hydraulic Resources" in Thailand (September 1984); two other persons to be identified to attend conferences to be designated

** Staff Travel \$ 5,200

* March or April 1985. Three to five participants for 2 weeks to India to observe and study minor irrigation systems.

WATER MANAGEMENT:

PROJECT SUPPORT THROUGH AGRICULTURAL ENGINEERING DIVISION

3. Overseas Training

\$ 30,500

** PhD Study in TWC

- * one person to pursue graduate work in agricultural (water component) engineering. Expected dates: Sep/85-Sep/87. Person-months in 1984-85: 0.0

** MSc Study in USA

-0-

- * one person to pursue work in groundwater hydrology. Expected dates: Sep/85-Mar/88. Person-months in 1984-85: 0.0

** MSc Study in TWC

-0-

- * one person to pursue work in pumps and motors. Expected dates: Sep/85-Mar/88. Person-months in 1984-85: 0.0

** Up to Six Months in USA

\$15,000

- * Three participants in short-term courses such as "Well, Pumps, and Pumping for Irrigation" at USU. courses to be identified.

** Up to Six Months in TWC

\$10,700

- * Two participants in courses such as "Water Management" at IRRI. Courses to be identified. \$10,000

- * 1983-84 Training participants costs expected to be recorded in 1984-85.

\$ 700

** Staff Travel

\$4,800

- * December 1984. Four participants for 2 weeks, one each from BAU, BRRI, BARI, and BUET to Burma or Pakistan to observe and study LLP and tubewell irrigation systems.

WATER MANAGEMENT:

PROJECT SUPPORT THROUGH ECONOMIC AND SOCIAL SCIENCES DIVISION

3. Overseas Training

\$ 27,000

** PhD Study in USA

-0-

- * One trainee to pursue graduate work in water law. Expected dates Sep/85-Sep/89. Person-months in 1984-85: 0.0

-0-

** MSc In TWC

-0-

- * One trainee to pursue work in water resources economics. Expected dates are Sep/85-Mar/88. Person-months in 1984-85: 0.0

-0-

** Up to Six Months in USA

\$11,000

- * Two participants in courses such as "Water Production Function" at USU. Courses to be identified.

\$11,000

** Up to Six months in TWC

\$ 5,000

- * Two participants in irrigation courses yet to be specified.

\$ 5,000

** Staff Travel

\$ 6,000

- * January or February 1985. Six participants for two weeks in a multidisciplinary team to Sri Lanka to study the organization and technology for efficient distribution of water in large-scale distribution systems.

\$6,000

PEST MANAGEMENT

3. Overseas Training

\$114,900

** PhD in USA

\$NONE

* Training in host plant resistance to pathogens. Candidate and institution not yet selected. Starting date Sept. 1, 1985, termination date August 31, 1989. Person months in 1984/85 0.0

\$ NONE

* Training in seed pathology. Candidate and institution not yet selected. Starting date Sept. 1, 1985, termination date Aug. 31, 1989.

Person months in 1984/85 0.0

\$ NONE

** PhD in TWC

\$ NONE

** MS in USA

\$15,000

* Training in Host Plant Resistance to Insects. Candidate and Institution not yet selected. Starting date June 1985, Termination date July 1987.

Person months in 1984/85 0.0

\$NONE

* Mrs. Parvin Sultana, Colorado State University, Ft. Collins, Colo. Degree in pest bird research and management, started March 83, ending in September 1985. 12 Person months.

\$15,000

** MSc in TWC

\$4,700

* Nazrul Islam, Central Luzon State University, Philippines, Insect Toxicology. Training began in July 1984;

Termination date January
1987. 12 months in 1984-
1985 funded under water
management.

* Md. Ashraf Khan, University
of the Philippines at Los
Banos, physiology and
epidemiology of citrus greening
disease caused by a mycoplasma.
Training relates to upgrading
plant pathology sub-discipline,
plant virology, started June,
1983, will terminate December
1985. 12 months in 1984-85. \$4,700

* Two candidates have been
nominated by Director, BARI,
from staff members of the
Vertebrate Pest Section,
for degree studies in Economic
Ornithology in either India or
the Philippines. Starting date
is tentatively set for June
1985. Termination date Dec.
1987. Person months in
1984-85 0.0 \$ NONE

** Up to 6 months in USA \$ 31,200

* Three scientists will be
sent to the University of
Minnesota in July 1984 for 2
weeks intensive training
in crop loss assessment.
Person Months in 1984/85 1.5 \$12,600

* One plant pathologist will
be sent to a major USA
University (probably Clemson)
for 3 months in June-August
1985 for intensive training
in the taxonomy of plant-
pathogenic nematodes.
Person Month 1.0 \$ 7,900

* One candidate will be
nominated to study all
aspects of vertebrate pest
research and management
(rodents, birds, jackals,
porcupines, squirrels and
wild pigs) to improve staff
capabilities in these program

areas. The studies would be carried out at the Denver Wildlife Research Center (DWRC), Colorado and at several of DWRC's field stations in the USA.

Starting date of studies is April 1985 and ending date is September 1985.

3 person-months \$10,700

** Up to 6 months TMC \$32,400

- * One entomologist will be selected for 6 weeks training in maintaining insect cultures, including meredix rearing techniques at IRRI, ICRISAT, or IARI. Fourth quarter 1984-85.

Person months in 1984/85 1.5 \$3,400

- * A training program in economic insect identification is being held in India by CIE in November-December 1984. Two candidates, yet to be selected, will be supported by IADS funds.

Person months in 1984/85 4.0 \$8,200

- * One entomologist will be sent to ICRISAT for 2 months of participant training in research methodology on pulses in the last quarter of 1984-85.

Person months in 1984/85 2.0 \$2,400

- * One plant pathologist will be sent to a Philippine Coconut Research station for 2-3 months in the 3rd quarter of FY 84/85 to study Cadang-Cadang disease.

Person Months in 1984/85 2.0 \$2,700

- * One plant pathologist will be sent to ICRISAT for 2 months training in pulse disease assessment in May-June 1985.

Person months in 1984/85 2.0 \$2,950

- * One plant pathologist will be sent to IARI for 2 months training in plant disease herbarium techniques during the 3rd quarter FY 84-85.
Person Months in 1984-85. 2.0 \$7,000
- ** International Conferences \$3,400
 - * International conferences provide a forum for interchange of ideas among scientists. None have been identified at this time; however, budget allocations should be provided for 6 participants to attend crop protection conferences that may occur in Asia in the 1984-85 year. One week per participant.
Person Months 1.5
- ** Staff Travel \$36,000
 - * Following the Crop Loss Assessment course in the USA, the PSO Entomology and PSO Plant Pathology will make an observational tour in Texas of 2 weeks to review IPM programs and virus diseases, respectively.
Person months \$8,000
 - * A senior staff member will visit ICRISAT and IARI for up to 2 weeks to review the research programs on insect pests of pulses, millets and fruit flies on cucurbits.
Person months 0.5 \$2,000
 - * One PSO Entomology will be sent to UPLB and IRRI for 2 weeks to review IPM on corn insects.
Person Months 0.5 \$2,000

- * Top senior staff will be sent on a one-month tour to review IFM and crop loss assessment programs in Asian research institutions during 4th quarter, FY 84-85. Person months 2.0 \$10,000
- * One senior staff member will visit Asian research institutes to review pest management aspects of Farming Systems Research. A four week tour including IRRI, ICRISAT, Thailand and UPLB is planned for 4th quarter FY 84-85. Person months 1.0 \$2,200
- * One senior nematologist will travel to IRRI/UPLB for literature review and review of research in 3rd quarter FY 84-85 for 2 weeks (0.75 Person months) \$2100
- * One senior staff member from the Vertebrate Pest Section will be nominated for a two-month study tour of coyote research and management techniques at the Denver Wildlife Research Center (DWRC) and DWRC field stations in Utah and Texas, USA. The training will be directly applicable to jackal problems in Bangladesh and should improve the staff capabilities in this problem area. Tour to start in April 1985. Person-months 2.0 \$10,000

International Conferences, Monitoring or
Study Tours
1984-85

PROGRAM AREA	P.M.	PERSONS	EVENT AND DESTINATION	SCHEDULED DEPARTURE	AMOUNT BUDGETED
RESEARCH MGMT.	9.5	Various Administra- tors or High level scientists			\$32,150
ACRL, INFORMATION	0.5	One Senior Research Scientist	Communication Conference/ Seminar		\$ 9,900
	1.0	Library Science	Unspecified		
FARMING SYSTEMS	1.5	Two from Coordinated CS Program	AFS Workshop Los Banos, Philippines	Jan. '85	\$ 3,200
	0.5	Member-Director [Crops]	Farming Sys- tem Symposium Kansas City, U.S.A.	Oct. '84	\$ 3,700
	1.5	Three CS Site Coordinators	2 FS Monitor- ing Tours at Philippines, Thailand	Dec. '84 and Feb. '85	\$ 6,600
	1.0	Fifty Bangladeshi Scientist and five expatriate Scientist	International Conference on Farming System Research		\$19,200
ECON. & SOC. SCI.	0.5	Prof. Lutfor Rahman, B.A.U.	Agri. Eco. Conference Cornell Uni- versity, USA	Unspecified	\$ 4,000
	1.0	Two persons	Unspecified	Unspecified	\$ 7,400
	1.0	Two persons	ICRISAT and IITA, India & Nigeria		\$ 4,000
	2.5	Five persons	Farming Sys- tem Research Indonesia	Unspecified	\$ 6,250
	2.5	Five persons	AARD, IRRI, ICAR, PCARR Indonesia, India and Philippines	Unspecified	\$ 6,250

PROGRAM AREA	P.M.	PERSONS	EVENT AND DESTINATION	SCHEDULED DEPARTURE	AMOUNT BUDGET
CROPS	1.5	Two Oilseed and Pulse Research Scientists	Oilseed & Pulse Research, India and Thailand	Nov. '84	\$ 6,150
AGRONOMY	1.5	Two Engineers	Farm Mech. Research Conf. Ireland	Jul. '84	\$ 7,000
HORTICULTURE	3.0	Three PSO's in Hort. Division of BARI	Study Tour, Thailand, Philippines & Malaysia	Mar. '85	\$ 3,750
LIVESTOCK	0.75	Three P.I.'s from Contract Research Project	Selected Res- earch Confe- rence	Feb. '85	\$ 7,000
	3.75	Five Livestock Research Scien- tists	Study tour to India, Pakistan, Thailand, Phili- ppines and Malaysia.	Jan. '85	\$ 7,000
SOIL SCIENCE	5.0	10 Soil Scien- tists	International Soils Confe- rence	Unspecified	\$24,750
	5.0	4 Soil Scientists	Regional Soil Network Meet	Unspecified	\$19,000
IRRI.WATER MGMT.	1.5	Three persons doing research in Irrigation	International Irrigation Conference	Unspecified	\$11,000
	2.0	Four Irrigation Researchers from BAU, BRRI, BARI and BUET	Study Tour to Burma or Pakistan	Dec. '84	\$ 4,800
	2.0	Four Irrigation Researchers	Study tour to India	Mar. '85	\$ 5,200
	2.5	Multidisciplinary Team of six persons	Study tour to Sri Lanka	Feb. '85	\$ 6,000

PROGRAM AREA	P.M.	PERSONS	EVENT AND DESTINATION	SCHEDULED DEPARTURE	AMOUNT BUDGETED
PEST MANAGEMENT	1.5	Six persons to International Conferences in Asia	Unspecified	Unspecified	\$ 5,400
	1.0	Two Scientists in Pest Mgmt.	Texas A&M	Jul. '84	\$ 8,000
	0.5	One Sr. Staff	ICRISAT and IARI in India	Jan. '85	\$ 2,000
	0.5	One SSO Ento- mologist	IRRI & UPLB Philippines	Feb. '85	\$ 2,000
	2.0	Two Senior Staff in Integrated Pest Management	Study Tour on Crop Loss Assessment Thailand, Philippines	May. '85	\$ 8,000
	1.0	One Senior PM Scientist fami- liar with Farming Systems Research	IRRI, ICRISAT Farm Suwan UPLB, Philippines, India Thailand	Apr. '85	\$ 3,900
	2.0	One Senior VPM Scientist	Vertebrate Pest at Denver WLR Center, USA	Apr. '85	\$10,000
	1.0	One Senior Nematologist	IRRI/UPLB	Apr. '85	\$ 2,100

1984-85
In-Country Short Term Training

PROGRAM AREA & COURSES	NO.	NO. OF PARTICIPANT	COURSE TITLE OR CONTENT AREA	DATES SCHEDULED	VENUE OR SPONSOR
RESEARCH	(6)	40	* Research Program Evaluation	Oct.1-3	ISNAR/IADS/BARC
		17	* Research Productivity Management	April	Asian Institute Management
		25	* Management Research Organization	Dec.1-19	OICD at IPSA
		25	* Technology Diffusion	Jan.13-Feb.5	OICD at IPSA
		40	* Financial Management	May(3 days)	ISNAR/IADS/BARC
		15	* Microcomputers in Field Crop Research	3 months April-June	Michigan State University
MAINTANANCE	(2)	15	* Spare Parts Storage & Inventory	10 days January	BARI
		15	* Motorized Equipment Maintenance	2 weeks May	BARI
AG. INFORMATION	(3)	45	* Three courses in Research Communications	15 days each Jan.-June	BARI, BRRI, ISNAR
		40	* Librarians of Research Institutes	one week in January	BARC/NALDOC
		25	* Editorial & Management Skills	one week in May	BARC
FARMING SYSTEMS	(7)	25	* Cropping System Methodology	Two weeks January	BARI/BRRI
		75	* C.S. Field Days-Scientist/Extension Person	Aug; Nov. and Feb.	RARS
		75	* Extension Workshops-One Day	Unspecified	BARI/BRRI/BJRI
		100	* Farmers Short Courses	Feb. & June	BARI/RARS
		100	* C.S. Extension Workshops (3 days)	Unspecified	BARI/RARS
		100	* 4 Research Result Seminars	Unspecified	RARS
		100	* Farmers Field Days	Unspecified	RARS

PROGRAM AREA &	NO. COURSES	NO. OF PARTICIPANT	COURSE TITLE OR CONTENT AREA	DATES SCHEDULED	VENUE OR SPONSOR
ECON. & SOC. SCI.	(13)	25	* Analysis Economic Research Data	10 days Unspecified	BARC
		10	* Multiple Regress Analysis	4 weeks March-April	BARC
		20	* Elementary Parametric Statistics	4 weeks March-April	BARC
		25	* Applied Matrix Algebra	3 weeks Unspecified	BARC
		20	* Elementary Price Analysis	2 weeks October	GTI/BARC
		20	* Economic Analysis of Crop System	3 weeks Unspecified	RARS
		20	* Agriculture Project Analysis	4 weeks Unspecified	BARC
		15	* Applied Cartography	2 weeks Unspecified	BARC/D.U.
		30	* Statistic in Agri. Research	4 weeks September	GTI/BARC
		15	* Microcomputers for Soc.Sci.Research	2 weeks June	BARC
		30	* Partial Bdugeting	3 days May	RARS
		24	* Analysis Socio-Economic Data	3 days each Unspecified Dates	RARS
		20	* Economics of Livestock Products	2 weeks	Unspecified
CROPS	(6)	20	* Breeding Methodology	Jan. 2 weeks	BARI
		20	* Breeding Methodology	Feb. 2 weeks	BARI
		20	* Pulses Production	Nov. 2 weeks	BARI
		20	* Oilseeds Production	Mar. 2 weeks	BARI
		20	* Malze Production	Apr. 2 weeks	BARI
		20	* Tuber Crops Prod.	Apr. 2 weeks	BARI
HORTICULTURE	(2)	17	* Applied Horticulture	Thruo months Jan.- March	BARI
		15	* Hort. Laboratory Skills	March	BARI

PROGRAM &	NO. COURSES	NO. OF PARTICIPANT	COURSE TITLE OR CONTENT AREA	DATES SCHEDULED	VENUE OR SPONSOR
LIVESTOCK	(10)	20	* Economics of Cattle/ Buffalo Production	September 2 weeks	GTI/BAU
		20	* Economic Goat Production	December 2 weeks	GTI/BAU
		20	* Fodder & Feed Production	March 2 weeks	GTI/BAU
		20	* Livestock Production	June 2 weeks	GTI/BAU
		25	* Poultry Production and Management	June 2 weeks	Mirpur PBF
		15	* Research Priorities (3 workshops)	September 2 weeks	BARC
		15	* - do -	December 2 weeks	BARC
		15	* - do -	March 2 weeks	BARC
		25	* Freshwater Agriculture	February 2 weeks	Unspecified
		30	* Brakish water Fisheries Research	June 2 days	Unspecified
SOILS	(4)	16	* Laboratory Skills	Nov. 3 weeks	BARI
		40	* Bio-Nit. Fixation	1 week Feb.-March	BAU
		36	* Fertilizer Research	Oct. 3 weeks	BJRI/BARI
		15	* Instrumentation	Mar. 2 weeks	BARI/BRRI/BJRI
IRRI. W. MGMT.	(16)	125	* 5 days Pumps & Motors	Oct.-June 5 repeat of same course	BRRI/BARI/ BJRI/IPSA
		25	* USDA On-Farm Water	Nov. 4 weeks	BARI/USDA
		25	* Groundwater	Jan. 4 weeks	UTAH/BARI
		25	* Irrigation Systems	Feb. 3 weeks	BARI/BAU
		25	* Pumps & Motors	April	BARI
		25	* Indigenous Irri.Appl.	Apr. 3 weeks	BARI
		25	* Water Prod.Function	May. 4 weeks	UTAH/BARI
		25	* Remote Sensing	June 4 weeks	BARI
		15	* Remote Sen.In Ag.Res.	June 2 days	BARC
		25	* Economics of Irri.	May 2 weeks	BARC/BARC
		30	* ATI Currie Workshops	Nov.	BARC/DAE

PROGRAM &	NO. COURSES	NO. OF PARTICIPANT	COURSE TITLE OR CONTENT AREA	DATES SCHEDULED	VENUE OR SPONSOR
		75	* Minor Irrig. Systems	July 8-9 2 days	BARC
		45	* Eval.Perf.Irr.Syst.	June 2 days	BARC
		45	* Dry-Field Irri.Crops	Feb. 2 days	BARI
		45	* Elect. Irri. Equip.	Apr. 2 days	BARI
		250	* Monthly Seminar on IWM	July-June 1 day/month	BARC
PEST MANAGEMENT (6)		25	* Design & Analysis Entomology Research	June 1 week	BARI
		15	* Plant Disease Diag. (Research)	Jan. 1 week	BARI
		20	* Plant Disease Diag. (Extension)	Jan. 1 week	BARI
		30	* Integrated Pest Management	Feb. 2 weeks	BARI
		60	* Vertebrate Pest Management	Mar. 1 day	DAE/BARI
		30	* Field Training in Vert. Pest Management	Oct.-May 1 day each	BARI/RARS

2.6 Projections for New Out-of-Country Scholarship

[1] Research Management - 4

M.S. in USA

- * One award in Agri. Inf./Communications
- * One award in Farm Operations
- * One award in Research Systems Management
- One award in Ed. Extension

[2] Economics & Social Science - (3)

Ph.D. in USA

- * One in Developmental Economics

M.S. in USA

- * Two in Agricultural Statistics
- * One applied in Anthropology

[3] Agronomy - (2)

Ph.D. in USA

- * Two in Field Crop Research Agronomy

[4] Horticulture - (5)

Ph.D. in USA

- * One in Vegetable Crops

M.S. in USA

- * Two in Vegetable Crops

M.S. in TWC

- * Two from Fruits & Vegetable Section of BARI.

[5] Irrigation Water Management - (7)

Ph.D. in USA

- * Two in Groundwater Development and Management

Ph.D. in TWC

- * One Ag. Engg. with emphasis on water distribution systems

M.S. in USA

- * Two in Ag. Engineering, one in Pumps and Motors, and one in Groundwater Hydrology.

M.S. in TWC

- * Two in Ag. Engineering, one in Pumps and Motors, and one in small scale distribution systems.

[6] Pest Management - (5)

Ph.D. in USA

* Two awards. One in Host Plant Resistance and one in Seed Pathology

M.S. in USA

* One in Host Plant Resistance

M.S. in TWC

* Two in Economic Ornithology.

[7] Soils - (2)

M.S. in USA

* One award in field of minimum tillage technology

M.S. in TWC

* One award in Soil Microbiology.

[8] Crops - (1)

Ph.D. in USA

* One in Plant Breeding with Specialization in Pulses and Oilseeds.

OUT OF COUNTRY
1984-85 SHORT TERM TRAINING

PROGRAM AREA &	NO. COURSES	TOPICS	PERSONS	R. M.	DATE	PLACE/ INSTITUTE
Res.Mgmt.	(2)	* Management	1	10.0	April	Washington-USDA
		* Management of Agr. Res.Facilities and Organization	2	3.0	July-Sept	Washington-USDA
Maintenance	(1)	* Laboratory equip- ment operation	1	6.0	Jan-March	AIT-Bangkok
Aril. Info.	(2)	* Communication Skills	2	6.0	Feb.-March	Cornell University
		* Communication Skills for professionals	1	.25	Dec.-Jan.	USAID
Farming Sys.	(2)	* Farming System	3	13.5	May-June	IRRI
		* Farming Systems	1	4.0	May-June	ICRISAT
Econ. & S.S.	(6)	* Role of Women in Rural Development	2	1.5	Nov.-Dec.	USDA-VPI
		* Irrigation Water Production function	2	2.0	Apr.-May	UTAH STATE
		* Agroeconomic Research	3	6.0	Oct.-Nov.	IRRI-LOS BANOS
		* Economics of Farming	3	2.25	May	ICRISAT
		* Rural Development Course	1	1.0	May-June	USDA
		* Agricultural Statistics	3	6.0	February	UPLB
Agronomy	(2)	* Seed Technology	2	1.0	August	UPLB-LAS BANOS
		* Technology Diffusion	5	15.0	Mar.-May	USDA
Horticulture	(1)	* Veg. Crops Production	6	30.0	Oct.-Feb.	KASETSART-AVRDC
Livestock	(1)	* Mgmt. Res.Facilities	2	3.0	Jul.-Sept.	USDA
Soil Science	(5)	* Minimum Tillage	1	3.0	Apr.-Sept.	UNIV. OF FLORIDA
		* Soil Research Tech.	2	12.0	Apr.-Sept.	UNIV. OF KENTUCKY
		* Soil Lab. operation	4	8.0	Apr.-Sept.	UNIV. OF GEORGIA
		* Problem Soils	10	20.0	Oct.-Dec.	BANGKOK AIT
		* BNF Resources	2	6.0	Dec.-Mar.	BANGKOK BNF RESOURCE CENTER

PROGRAM AREA &	NO. COURSES	TOPICS	PERSPMS	P.M.	DATE	PLACE/ INSTITUTE
Irri. Water Management	(7)	* On-Farm Water	2	2.0		AIT-Bangkok
		* Water Mgmt. by Irrig.	2	4.0		IRRI-LAS BARROS
		* Irri. Prob. & Practice	3		Unspecified	UTAH STATE
		* Irri. Water Mgmt.	10	0.0	June	IARI-NEW DELHI
		* Water Conservation	3	3.0		USU
		* Water Prod. Function	2	2.0	Oct.-Nov.	UTAH STATE
		* Irri. Organizations	2		Oct.-Nov.	UTAH STATE
Pest Mgmt.	(7)	* Crop Loss Assessment	2	1.5	July	U. of Minnesota
		* Vert. Pest Management	1	3.0	Apr.-Aug.	Denver WRC
		* Entomology Lab	1	1.5	April	IARI-DELHI
		* Insect Lab Work	2	3.0	December	CIE-ACRA, INDIA
		* Ent. Research Tech.	1	1.5	Apr.-May	ICRISAT
		* Plant Pathology	1	2.0	February	PCPS, Philippines
		* Plant Pathology	1	2.0	June	ICRISAT

1984-85
Resource Persons for Training

PROGRAM AREA		TRAINING COURSE INVOLVED	PERSON AND AFFILIATION
RESEARCH MGMT.	(5)	<ul style="list-style-type: none"> * Using Microcomputers in Research * Research Mgmt. & Evaluation * Managing Research Organizations * Technology Diffusion * Financial Mgmt. Res. Organization * Dynamics of Management 	<ul style="list-style-type: none"> Michigan State University Team Dr. Josetta Murphy - ISNAR Mr. Donald Spears OICD/USDA OICD/USDA OICD/USDA Asian Institute of Management
MAINTENANCE	(2)	<ul style="list-style-type: none"> * Inventory, Storage Management of Spare Parts * Maintenance Motorized Equipment 	<ul style="list-style-type: none"> Mr. Harvey Carr Mr. Harvey Carr
AC. Information	(1)	<ul style="list-style-type: none"> * Editing and Managing Scientific Journals 	Resource Person under Negotiation
ECON. & SOC. SCI.	(7)	<ul style="list-style-type: none"> * Application of Statistics in Agricultural Research * Agri. Project Analysis * Analysis Crop Syst. Res. Data * Analysis Economic Res. Data * Multiple Regression Analysis * Applied Cartography * Application Microcomputers for Social Sciences 	<ul style="list-style-type: none"> S.C. Pearce, R.E. Kempson, G.V. Dyke of Kent University, U.K. Dr. B. Wennegren - Urah St. Uni Dr. M. Van der Veen, IRRI Dr. J.R. Nix, WYE College, U.K. Dr. R. Dempson, WYE College, U.K. Dhaka Univ. Dept. of Geography Michigan State University
IRRI. W. MGMT.	(10)	<ul style="list-style-type: none"> * Pump Irrigation in Bangladesh * On-Farm Water Management * Groundwater * Irrigation Systems * Pumps & Motors Technology * Improvement Indigenous Appliances for Irrigation * Water Production Functions * Technique for Remote Sensing in Agricultural Research * Using Remote Sensing in Ag. Res. * Economics of Irrigation 	<ul style="list-style-type: none"> BARC/BARI USDA Team Utah St. or Colorado St. Univ. BARC/BARI Staff Utah State University BARC/BARI Utah State University South Dakota State University South Dakota State University BARC/BARI Staff

PROGRAM AREA	TRAINING COURSE INVOLVED	PERSON AND AFFILIATION
PEST MANAGEMENT	(4) * Experimental Design Entomology Research	Under Negotiation
	* Plant Disease Diag. Technology	Univ. of Florida Team
	* Integrated Pest Management	Consortium for International Crop Protection
	* Vertebrate Pest Management	Denver Wildlife Research Center.

1984-85
In-Country Degree Program

PROGRAM AREA	PH.D	M.S.	P.M.	INSTITUTION	COMPLETION EXPECTED
RESEARCH MGMT.	None	None			
EXTENSION/TR.					
* Ongoing	1	-	12.0	BAU	2/88
* Admission Reg.	1	2	12.0	IPSA/BAU	12/88
ECONOMIC & S.S.					
* Ongoing	-	1	12.0	BAU	7/85
* Admission Reg.	-	-	0.0	IPSA/BAU	12/86
AGRONOMY					
* Ongoing	1	-	12.0	BAU	2/87
	-	1	10.0	BAI	5/86
* Admission Reg.	4	-	24.0	IPSA/BAU	12/88
	-	4	18.0	IPSA/BAU	12/86
PLANT BREEDING					
* Admission Reg.	-	5	30.0	IPSA/BAU	12/86
HORTICULTURE					
* Admission Reg.	-	3	18.0	IPSA/BAU	12/86
	1		6.0	BAU	12/88
LIVESTOCK					
* Admission Reg.	2	-	12.0	BAU	12/88
	-	4	0.0	BAU	7/87
SOIL SCIENCE					
* Ongoing	-	1	6.0	BAU	11/84
	-	1	6.0	BAU	12/84
* Admission Reg.	1	-	6.0	IPSA/BAU	12/88
	-	1	6.0	IPSA/BAU	12/86

PROGRAM AREA	PH.D.	M. S.	P. M.	INSTITUTION	COMPLETION EXPECTED
IRRIGATION W.M.					
* Scholarship Requested	-	4	0.0	D.U./BUET	12/86
PEST MANAGEMENT					
* Ongoing	-	1	5.0	BAU	11/84
	-	1	6.0	BAU	3/86
* Admission Reg.	3	-	0.0	BAU	2/89
FISHERIES					
* Admission Reg.	-	1	6.0	BAU Chittagong University	12/87